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CIRCLE WEST II TRACT

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FORT UNION COAL REGION

CIRCLE WEST II TRACT ANALYSIS

SITE SPECIFIC ANALYSIS

PRELIMINARY FACILITY EVALUATION REPORT

MCCONE COUNTY, MONTANA

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September 1981

Michael J. Penfold
State Director

PREFACE

This document contains a site-specific analysis and a preliminary facility evaluation report. The site-specific analysis discusses the consequences of leasing and mining a particular tract. The preliminary facility evaluation report discusses significant issues associated with an end use coal conversion facility.

There were 24 tracts identified through a screening process under the over-all direction of the Fort Union Region Coal Team. The team consists of federal, state, and local officials. The tracts are being evaluated for potential federal coal leasing for a coal lease sale scheduled for June 1983. The evaluation, called a site-specific analysis, has been completed for each of the 24 tracts.

Historically, development of a new coal mine in the Fort Union Coal Region has been associated with a coal conversion facility power plant in the vicinity of the mine. For this reason, the Regional Coal Team directed BLM to evaluate impacts of a typical facility near each potential mine. A preliminary facility evaluation report was prepared for each facility.

The Fort Union Regional Coal Team will begin ranking and grouping selected tracts into alternative leasing patterns for the 1983 lease sale using information from these individual reports. These groupings of tracts will form the basis for alternatives and a regional environmental impact statement to be developed during 1982. The analysis in this report represents an important step in a lengthy process which takes place prior to any final decision on federal coal leasing within the region.

Of the 24 tracts currently being evaluated, 16 would require the opening of new mines. One of the 16 would be specifically earmarked for small business. The remaining eight tracts constitute coal which would be needed to maintain production or prevent the by-pass of federal coal at an ongoing mining operation.

Approximately 1.6 billion tons of recoverable federal coal lie within the areas being evaluated. Final designation of some areas as unsuitable for mining under the 1977 Surface Mining Control and Reclamation Act will likely reduce the amount of federal coal actually available for leasing and development, and could remove several of the 24 tracts from further consideration. This information will not be available until early 1982.

A major purpose of the site-specific analysis and preliminary facility evaluation reports is to acquaint the public with key issues and consequences of leasing and development of federal coal reserves so that they may (1) offer comments to the Fort Union Regional Coal Team on what areas they consider most important to be evaluated and analyzed in the ranking of the tracts and in the Regional EIS and (2) offer specific advice on what decision alternatives the Coal Team should look at more closely.

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SITE SPECIFIC ANALYSIS

SITE SPECIFIC ANALYSIS

INTRODUCTION

The purpose of this action is to offer strippable federal coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the Nation.

This site specific environmental analysis has been prepared for the Circle West II tract (see Map 1) in accordance with federal regulations (43 CFR 3420). It will be used by the Fort Union Regional Coal Team to further consider competitive leasing of federal coal within the tract for a June 30, 1983, coal lease sale schedule. If selected and leased, the Circle West II tract will contribute 89.1 million tons of federal coal to the regional leasing target. Presently, a regional leasing target has not been established by the Secretary of the Interior. The preliminary regional leasing target will be established in August 1981 and finalized in October 1981.

BACKGROUND

In September of 1979, the Miles City District BLM Office completed the Redwater Management Framework Plan (MFP) for Dawson, McCone, Richland and Wibaux counties. The land use planning process included applying unsuitability criteria as much as possible, multiple-use conflict evaluation, and surface owner consultations. As a result of that work, areas were identified that could be further considered for coal development. The areas are available for consideration for new competitive leasing, leasing by exchanging and modifying existing leases (see Map 1).

Following land-use planning, the BLM requested expression of interest which, along with other information, guided the USGS in delineating this tract. Results of that work are summarized in this profile.

Personnel from BLM Miles City District inventoried the tract to determine the site specific resource values and then analyzed potential environmental effects of coal development on this individual tract. Among other items, the unsuitability criteria (43 CFR 3461) were reconsidered on this site-specific basis. Any new findings of unsuitability are reflected in this report.

To be further considered for new competitive leasing, the tract will be presented to the Regional Coal Team who will rank and select tracts for a proposed lease sale schedule. The proposed lease sale tracts are then analyzed in a regional environmental impact statement (EIS). The EIS will analyze the site-specific and regional cumulative effects of coal leasing and development. Alternatives addressed in the EIS will include different combinations of tracts that meet a regional coal leasing target. The analysis of those groups of tracts could result in different impacts than the assessment made in this document for this specific tract. During the process this preliminary tract could be modified. Ultimately, the Secretary will select specific tracts for lease sale. If the tract is leased, the lessee will be required to submit a plan for mining and reclamation to the Secretary of the Interior, Office of Surface Mining (OSM) for review and approval within three years after leasing. Once a mining plan has been submitted, OSM will review the proposed developments of the mining plan. OSM will prepare a site-specific environmental assessment or EIS prior to approval of the mining plan.

Development of the tract is in accordance with the federal coal management program adopted by the Secretary of the Interior in June 1979. Basis of the program was, in part, the Final Environmental Statement for the Federal Coal Management Program. Implementation procedures are contained in Title 43—Code of Federal Regulations—Part 3400 (43 CFR 3400). Authorizing actions are The Mineral Leasing Act of 1920, as amended; The Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976; as amended; and federal regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

TRACT DELINEATION REPORT SUMMARY

The Circle West II tract is located in the Great Plains physiographic province and lies approximately twenty miles west of Circle in McCone County, Montana. The tract contains one economical recoverable seam (the "S" bed) of lignite coal.

The seam averages 16.0 feet thickness, with overburden ranging from less than 150 feet to 200 feet in depth. There are no known geological hazards to surface mining in the Circle II tract.

The generic mining plan calls for a surface mine using draglines, electric shovels, bottom-dump coal haulers, scrapers and other support equipment. A possible mining sequence for analysis purposes is shown on Map 2. The coal would thus be mined to a depth of 200 feet or until the limiting stripping ratio (20:1) has been reached. The plan indicates the most probable use of the coal would be an on-site electrical generation plant.

PRELIMINARY TRACTS

Redwater and Golden Valley

KRCRA Areas

1 Circle

2 Burns Creek-Thirteen Mile Creek

3 Southwest Glendive

4 Wibaux-Beach

Tract Delineation Areas

(1) Circle I

(2) Circle II

(3) Circle III

(4) Redwater I

(5) Redwater II

(6) Southwest Glendive

(7) Bloomfield

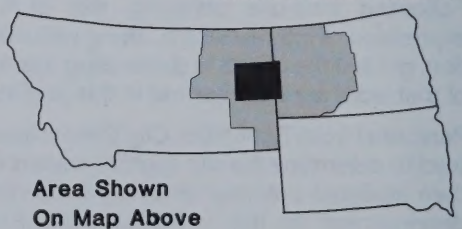
(8) Central Bloomfield

(9) Burns Creek

(10) North Wibaux-Beach

(11) South Wibaux-Beach

Total Ft. Union Coal Region



Area Shown On Map Above

★ Savage Mine

MAP 1

Specific Tract Characteristics:

Acreage:

Surface:	Federal	1401
	State	640
	Private	8,983
	Total:	11,024
Coal:	Federal	4,193
	State	640
	Private	6,191
	Total	11,024

Coal Reserves/Millions of Tons:

In Place:	Federal	99.0
	State	28.0
	Private	146.0
	Total	273.0
Recoverable:	Federal	89.1
	State	25.2
	Private	131.4
	Total:	245.7

Coal Quality: Average of samples as received from vicinity of tract:

Moisture	30.8%
Ash	5.9%
Volatile matter	27.3%
Sulfur	0.3%
Fixed carbon	35.9%
BTU's/lb	7,460

Surface Disturbance/acres

Mining: Annual rate, 245.5; Total Life of Mine, 9,739

Haul Roads: 176

Mine Facilities: 160 - may include: changehouse, office warehouse, equipment repair shops, fuel, water and explosive storages, equipment and employee parking lots.

Stripping Ratio: Less than or equal to 20 to 1

Coal Thickness: Average, 16.0

Mine Employment:
Construction Phase - 105 employees
Production Phase - 195 employees (maximum)

Annual Royalties and Severance Taxes:
Federal Royalty, $1.66 million
State Royalty, $.46 million
State Severance Tax, $7.32 million.

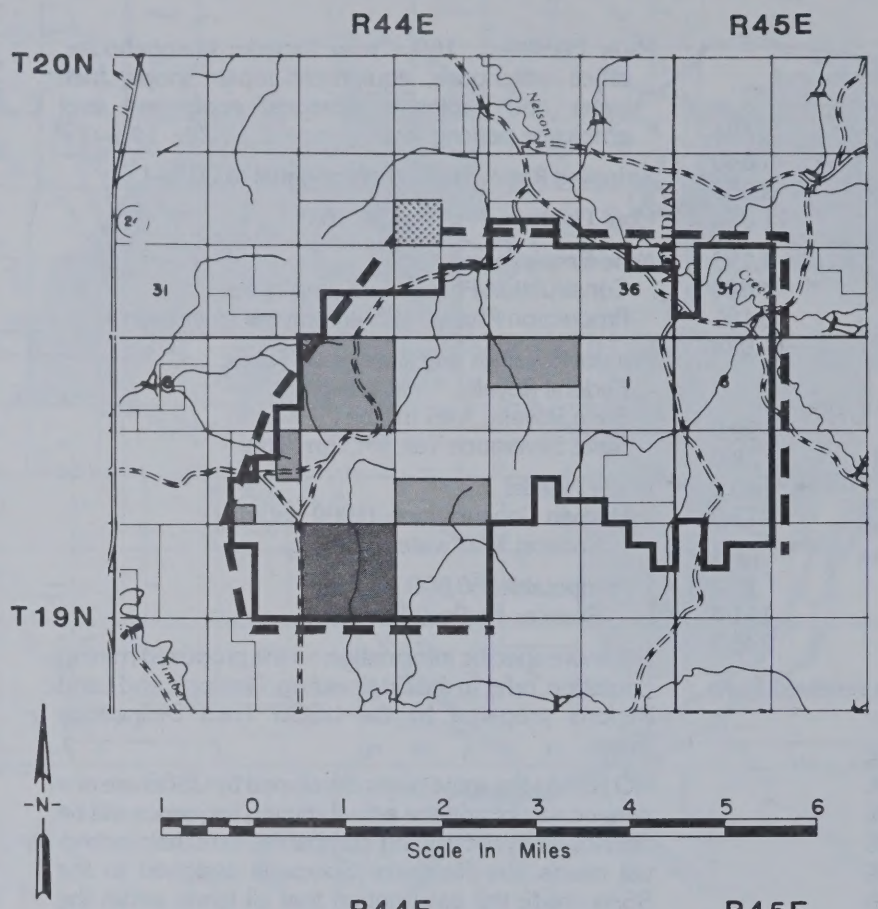
Water Needs:
Human Consumption, 6,000 gal./day
Source: Well water

Nonpotable, 60,000 gal./day
Source: Ft. Peck Reservoir

For more specific information on the proposed mining operation, refer to the Engineering, Geologic and Land Reports prepared by the USGS Tract Delineation Team.

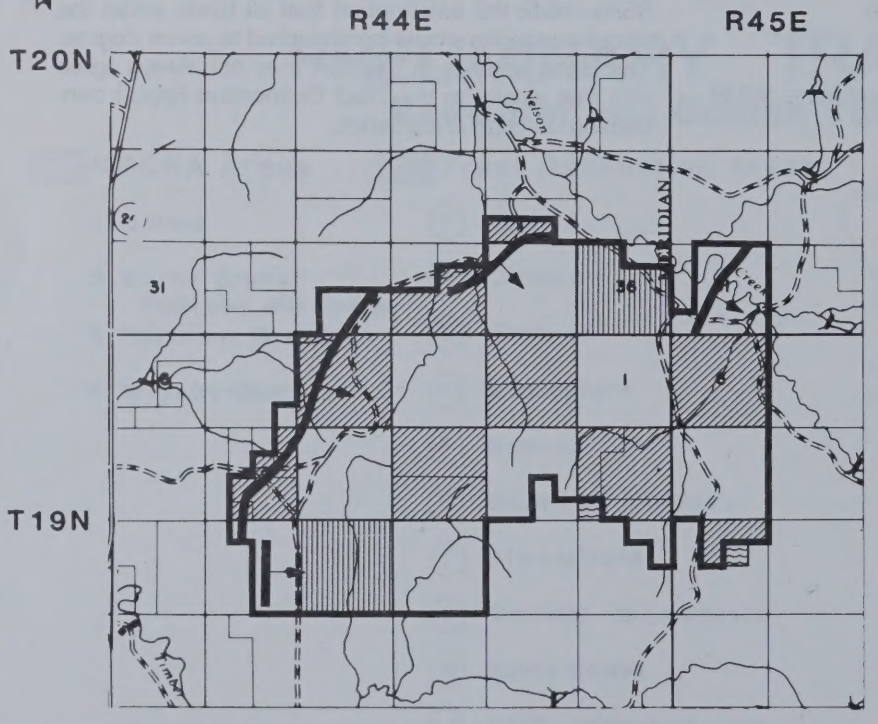
NOTE: As the mine plans developed by USGS are of a generic nature and the actual mining sequence will be developed by the mining companies to fit their individual needs, the Resource Specialist assigned to the SSAs made the assumption that all lands within the tract boundaries would be disturbed to some degree. Therefore, acreage in the SSA may not always agree with that shown in the Tract Delineation Report concerning acreage disturbance.

SURFACE



LEGEND

- Tract Boundary
- Federal Coal
- State Coal
- Private Coal
- Federal Surface
- State Surface
- Private Surface
- Bypasses
- Surface Facilities
- Out-of-Pit Haul Roads
- Pit Advancement



SUBSURFACE

CIRCLE WEST TRACT II

MAP 2

CHAPTER I
ALTERNATIVES

LEASING AND DEVELOPMENT

This alternative is to offer for further consideration federal coal in the Circle West II tract for competitive leasing. This tract has been identified as a logical mining unit for a 40-year surface mining operation.

Relationship to Land Use Planning

The tract does not include any lands for which the surface owner has filed a valid nonconsent to mining prior to March 1, 1981. Unsuitability criteria numbers 1, 2, 4 through 6, 8, 16 through 18, and 20, as defined in the federal regulations CFR Subpart 3461 has been fully applied to the private surface over Federal coal. Criteria numbers 9 through 15 and 19 involving fish and wildlife are pending further study. This criteria will be applied prior to the Final EIS as the data becomes available. Criterion 3 involving buffer zones along rights-of-way and adjacent to dwellings must be resolved prior to mining. Criterion 7 on cultural resources will be cleared through mining plan submission, which will include mitigation or avoidance measures.

Criteria 19 will be determined by the Office of Surface Mining. Current unsuitability concerns are shown on Map 3. These unsuitability criteria are listed as follows:

(1) Federal Land System
(2) Rights-of-Way and Easements
(3) Buffer Zones along R/W and Adjacent to Communities and Buildings
(4) Wilderness Study Areas
(5) Scenic Areas
(6) Lands Used for Scientific Studies
(7) Historic Lands and Sites
(8) Natural Areas
(9) Federally Listed Endangered Species
(10) State Listed Endangered Species
(11) Bald and Golden Eagle Nests
(12) Bald and Golden Eagle Roost and Concentration Areas
(13) Falcon Cliff Nesting Sites
(14) Migratory Birds
(15) State Resident Fish and Wildlife
(16) Floodplains
(17) Municipal Watersheds
(18) National Resource Waters
(19) Alluvial Valley Floors
(20) State Proposed Criteria

The nearest active mine is the Savage Mine located 30 miles east of the tract. Production of the Savage mine is about 0.3 million tons annually. The tract lies on the western flank of the Williston Basin oil and gas field. All of the federal lands within the tracts are subjected to oil and gas leases. No active leases or wells are located in the tract. Farming and ranching are the only other significant activities in or near the tract.

Mitigation Measures

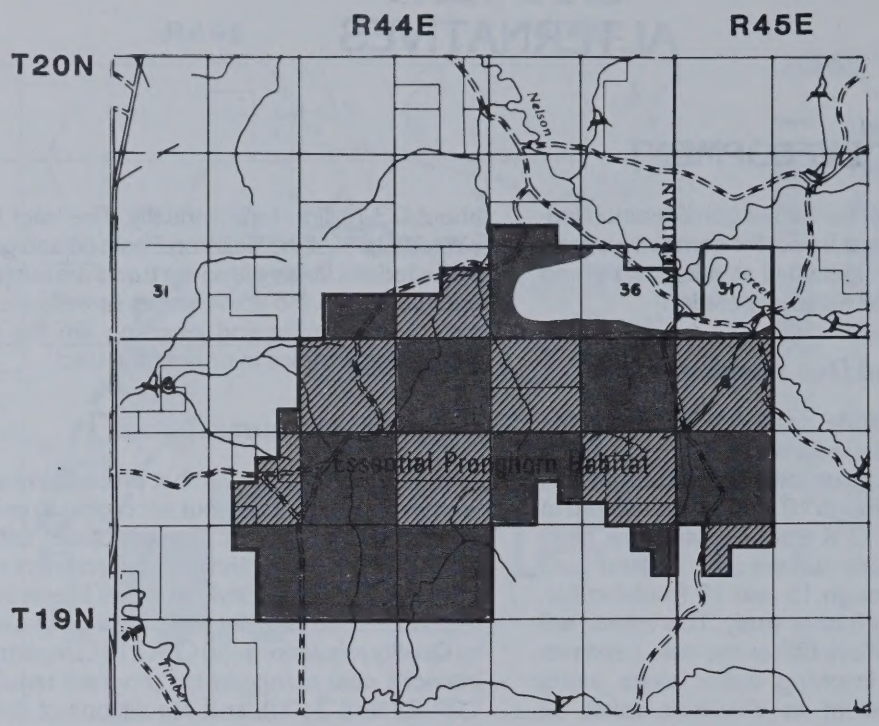
This alternative assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement regulations (30 CFR 700-899), Environmental Protection Agency regulations (40 CFR 0-1399), Council of Environmental Quality regulations (40 CFR 211), Department of the Interior's coal management program regulations (43 CFR 23 and 3400), and regulations of the Montana Department of State Lands. No additional mitigation under the authority of the federal government has been identified.

NO LEASING ALTERNATIVE

Federal coal would not be offered for leasing under this alternative. Federal reserves represents about 36 percent and State reserves about 10 percent of the coal available in the tract. If federal coal is not leased, development of a large economical mining unit is not feasible. (Ref. GS Circle West II Engineering Report for Circle West)

There were no small business expressions of leasing interest for the area. Considering the amount of federal coal involved, the checkerboarded pattern of federal coal ownership and the apparent trend in small mine development, near future development of any small coal mines in the tract boundary is not likely.

Should the Circle West II tract not be considered for further leasing, there would be about 6 percent or (99 million tons) less federal coal available within the Fort Union Region for consideration in tract selection to meet the federal leasing target. Also about 25 million tons of State and 131 million tons of private coal would be lost for possible production in the region. As discussed in Chapter II, few significant changes to the existing environment would be expected during the next 40 years.



CIRCLE WEST TRACT II

LEGEND

Areas that may be declared unsuitable for surface mining based on existing information.

- By BLM
- By Others
- Federal Coal

MAP 3

CHAPTER II
AFFECTED ENVIRONMENT

This section is a description of the current environment with anticipated changes from ongoing trends. Within the Williston Basin there has been an increase in oil and gas exploration and this trend is expected to continue. The physical resources described in this section represent only existing conditions while the social and economic sections account for existing conditions and ongoing trends. It is recognized that the physical resource values may change due to future oil and gas exploration.

TOPOGRAPHY

Surface expression consists of a narrow, northwest trending divide that separates the drainage systems of Timber Creek and Nelson Creek. Terrain is occasionally rugged in areas where erosion has steeply incised the drainages (see Figure 1). Elevations range from 2460 feet to 2800 feet.

GEOLOGY

The area is underlain by sandstone, shale, and lignite beds belonging to the Tongue River Member of the Fort Union Formation (Paleocene). Of three major lignite seams that occur in the tract, the "S" Bed is the most economically important. The "Q" and "R" Beds are stratigraphically higher and have burned or been eroded from much of the area. Recoverable reserves have been estimated at 245.7 million tons.

Although no discoveries of other minerals have been made within the tract, the area is underlain by formations that are prospectively valuable for oil and gas. No other mineral values are known to occur within the tract.

SOILS AND RECLAMATION POTENTIAL

Soils within the tract are formed on sandstone and shale uplands. These occur along undulating to hilly and steep, dissected sedimentary plains. Profile development and depths vary due to climate, parent material and geomorphic stability.

There are 35 soil series in the tract, surveyed by the Soil Conservation Service at level three. Table 1 identifies erosion potential, soil reconstruction potential, etc. for the soils within the tract.

HYDROLOGY

Surface Water

The tract is drained northward by tributaries to Nelson Creek and to the south by tributaries to Timber Creek (Map 2). These streams flow intermittently, mainly in response to summer thunderstorms and snowmelt in February through April. Nelson Creek has flow about 100 days per year and the tributaries are estimated to have flow 30 days or less per year. The estimated annual yield of Nelson Creek at its western intersection with the tract boundary is 1,120 acre-feet (AF) from about 60 square miles upstream (based on an average annual runoff of 0.35 inch). The 10-year peak flow at the same point is about 1,780 cubic feet per second (cfs). The chemical quality varies substantially with volume of flow. Storm runoff generally ranges from 200 to 800 milligrams per liter (mg/l) in dissolved solids and the water, judging from the surrounding area, would likely be a calcium bicarbonate type. Low flows, including groundwater inflow would be considerably higher in dissolved solids, ranging from 800 to 6,000 mg/l and the water commonly is a sodium sulfate type. The flow is used by stock and wildlife and contributes to the storage in Fort Peck Reservoir.

Groundwater

Near-surface aquifers in the tract are the alluvium, Tongue River, and Tullock. Both the Tongue River and the Tullock are eroded and exposed to the northwest on the terraces overlooking Fort Peck Reservoir. At greater depth is the Fox Hills-lower Hell Creek aquifer which crops out to the northwest along the shores of Fort Peck Reservoir. Groundwater flow in the near-surface aquifers generally follows the topography and flows toward Nelson Creek and Fort Peck Reservoir. In the deeper Fox Hills-lower Hell Creek aquifer, groundwater flows northeastward.

Only the Tongue River aquifer is developed by wells in and near the tract. Three stock wells have been inventoried within the tract and five stock wells and two domestic wells have been inventoried outside but within one mile of the tract boundary. The wells range from about 30 feet to 200 feet in depth and depth to water in the wells ranges from about 15 to 160 feet. Well yields range from 3 to 10 gallons per minute (gpm). The groundwater is a sodium sulfate to sodium bicarbonate type and the dissolved solids content ranges from about 1,000 to 4,000 mg/l.

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Figure 1. In some places, terrain is broken by eroded drainages.

TABLE 1
CIRCLE WEST II TRACT
SOIL EROSION

SOIL MAPPING UNIT NAME	DEPTH 1/ SHALLOW 0-20"	MODERATELY DEEP 20-36"	DEEP 36+"	PERCENT SLOPE	SOIL EROSION POTENTIAL 1/ WIND	WATER	SURFACE ACRES	PERCENT OF AREA	SOIL RECONSRT. POTENTIAL 2/	SOIL HAZARD CONDITIONS	SUITABILITY OF SOIL MATERIAL FOR PLANT GROWTH (ACRE FEET) 3/ GOOD	FAIR	POOR
Alona silt loam			X	0-4	Low	Low	91	1	Poor	Excess lime and sodium	--	61	394
Alona silt loam			X	4-8	Low	Mod.	20	<1	Poor	Excess lime and sodium	--	13	87
Alona silt loam, saline			X	0-2	Low	Low	26	<1	Poor	Excess salts and sodium	--	17	113
Busby fine sandy loam			X	2-15	High	Mod.	203	2	Fair	Excess lime	140	875	--
Chinook fine sandy loam													
Busby-Twilight complex		X(.30)	X(.70)	2-8	High	Mod.	71	1	Fair	Excess lime	33	229	36
Busby-Twilight-Fleak complex	X(.20)	X(.25)	X(.55)	8-15	High	High	38	<1	Fair	Excess lime	18	97	19
Busby-Yetull complex			X	2-8	High	Mod.	9	<1	Fair	Excess lime, too sandy	2	40	2
Cabbart silt loam	X			15-25	Low	High	287	3	Poor	Excess lime	--	430	1005
Cabbart-Badland complex	X(.60)		X(.40)	15-45	High	High	4052	37	Fair	Excess lime	973	4488	2122
Cabbart-Twilight complex;													
Busby-Fleak complex													
Cabbart-Kirby complex	X(.53)		X(.47)	8-45	High	High	340	3	Poor	Excess lime, stoniness	7	435	619
Cabbart-Yawdim complex	X(.90)		X(.10)	4-45	Mod.	Mod.	16	<1	Fair	Excess lime	--	19	11
Cambeth silt loam;			X	0-8	Low	Mod.	1705	15	Fair	Excess lime	1107	3805	3612
Floweree silt loam													
Cambeth-Cabbart Silt loams	X(.35)		X(.65)	8-15	Low	High	368	3	Poor	Excess lime	118	316	1406
Cambeth-Twilight-Cabbart complex	X(.30)		X(.70)	4-15	Mod.	Mod.	1961	18	Poor	Excess lime	1392	1196	3824
Floweree-Cambeth silt loams	X(.05)		X(.95)	2-8	Low	Mod.	54	<1	Poor	Excess lime	18	83	165
Havre silt loam; Yamac			X	0-4	High	Low	283	3	Poor	Excess lime	21	220	1173
loam; Lonna-Havre													
Glendive complex													
Kremlin loam			X	0-4	Mod.	Low	63	1	Good		168	147	--
Kremlin loam			X	4-8	Mod.	Mod.	135	1	Good		360	314	--
Lonna silty clay loam;			X	0-8	High	Mod.	858	8	Poor	Excess lime	99	912	3279
Yamac loam													
Twilight-Yetull complex	X(.05)	X(.55)	X(.40)	8-15	High	High	169	1	Fair	Excess lime, too sandy	164	348	66
Typic Fluvaquents, saline			X	0-2	Low	Mod.	82	1	Poor	Excess lime	--	--	410
Ustic Torriorthents - Ustic	X(.50)		X(.50)	--	Too Var	High	67	1	--	Too variable to rate	--	--	--
Torriofluvents association													
Yamac loam			X	8-15	High	High	11	<1	Poor	Excess lime	2	6	48
Yamac-Twilight complex		X(.30)	X(.70)	2-8	High	Mod.	63	1	Poor	Excess lime	35	48	168
Yamac-Twilight-Fleak complex	X(.10)	X(.25)	X(.65)	8-15	High	High	52	<1	Poor	Excess lime	28	36	102
TOTALS							11024	100			4,685	14,135	18,661

Soil Depths
Shallow -34%
Mod. Deep - 1%
Deep - 65%

Soil Erosion Potential
Wind
Low - 23%
Mod. -20%
High -56%
Too Variable 1%
Water
Low 5%
Mod. - 47%
High - 48%

Soil Reconstruction Potential
Good - 2%
Fair - 56%
Poor - 41%
Too Variable - 1%

Suitability of Soil Material for Plant Growth
Good - 8%
Fair - 26%
Poor - 34%
Unsuitable - 32%

1/ Soil Depth Classification and Soil Erosion Potential is derived from McCone County Soil Survey

2/ Soil Reconstruction Potential is derived from the National Soils Handbook.

3/ Depth (in acrefeet) of available soil calculated from acres x acrefeet/acre = suitability of soil material for plant growth.

LAND USE

Vegetation and Agricultural Production

Agricultural operations in this area consist of: (1) livestock and (2) small grains and livestock (See Table 2). Most of the farming in this area is dryland. A crop-fallow system is used in the dryland farmed area with mainly wheat or barley being grown. Small acreages are used for other small grains, forage crops, or pasture.

Four agricultural operators have some of their operation within the tract. However, only one agricultural operator has cropland within the tract (Table 3). This operator has 800 total acres (241 acres of cropland) with 560 acres (113 acres of cropland) or 70 percent of the operation included in the tract.

The three other operators have most of their grain and livestock operations outside the tract. As a group, over 85 percent of their operations lie outside the tract. Livestock grazing is the dominant land use, occupying 99 percent of the tract and 89 percent of the lands controlled by the same operators outside the tract (Table 3).

Approximately 3,022 AUMs of native forage for livestock are produced annually on the tract. No hay is produced on the tract, but the operators produce approximately 1,820 AUMs of hay outside the tract. The acres of cropland are too few for wintering livestock inside the tract.

The vegetation on the tract is a blending of the Prairie County Grassland and the Central Grassland (Payne, 1973). The most prominent subtypes are steppe grassland, silver sagebrush, big sagebrush and riparian shrub.

About 42 percent of the tract is moderately to strongly rolling terrain. The other 58 percent is gently sloping uplands or drainage bottoms. The silver sagebrush and riparian shrub areas are well-defined by the drainage patterns. As a distinct subtype, big sagebrush was identified only in the north end of the tract. About 81 percent of the tract is in good condition, leaving 19 percent in fair or poor condition (McCone County Conservation District, 1976).

Agricultural Economics

This section will be forthcoming under separate cover.

Residential Homes

No structures exist within the unit other than fences.

Transportation and Access

Access is available to the unit from State Highway 200, 9 miles to the south, and State Highway 24, 3 miles to the west, over primitive jeep trails. A spur of the Burlington Northern Railway terminates at Brockway 19 miles to the southeast from the mine tract.

Existing Rights-of-Way (Corridors)

A 230 KV transmission line exists approximately 14 miles northeast of the tract. A 69 KV transmission line is located 9 miles south along Highway 200. The proposed route of the Northern Tier pipeline is located approximately 3 miles northwest and an application (M29680) is on file for a 66-inch water pipeline from Fort Peck Reservoir to the mine facility.

TABLE 2[1]
Agricultural Land Use

Land Use	Tract Acres	Average Production Per Acre	Total Annual Production
Cropland	68	28.4 bushels	1,931 bushels
Hayland	0	0	0
Range	10,911	0.277 AUMs	3,022 AUMs
Other	0	0	0
Fallow	45	0	0
Total	11,024		

[1]Data collected from Dawson County Agriculture Stabilization and Conservation Committee, Glendive, Montana, 1981.

TABLE 3

CIRCLE WEST II

Circle West II

FARM/RANCH OPERATIONS 1/

OPERATOR	INSIDE COAL TRACT (acres)							OUTSIDE COAL TRACTS (ACRES)							
	SMALL GRAIN CROP	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	PERCENTAGE OF TOTAL ACRES LEASED	SMALL GRAIN	HAY	GRAZING	SUMMER FALLOW	OTHER	TOTAL	GRAND TOTAL	PERCENTAGE OF THE OPERATION WITHIN THE TRACT
1	68	0	447	45	0	560	0	78	0	112	50	0	240	800	70.00
2	0	0	7,833	0	0	7,833	41.38	1,570	0	26,258	975	46	28,854	36,687	21.35
3	0	0	1,518	0	0	1,518	68.38	1,265	94	20,619	550	0	22,528	24,046	6.31
4	0	0	1,113	0	0	1,113	56.78	1,252	356	10,347	569	0	12,524	13,637	8.16
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															
19															
20															
21															
TOTAL	68	0	10,911	45	0	11,024		4,165	455	57,336	2,144	46	64,146	75,170	

1/ Data collected from McCone County Agriculture Stabilization and Conservation Committee, Circle, Montana, 1981.

Recreation

Circle West II does not have reliable vehicular access. Dirt ranch roads are the major travel corridors. There are no recreation facilities within the tract. Seasonal big game hunting is probably the sole recreational activity occurring on this land. Sportsmen must secure landowner permission to legally use the area. No developed facilities are known to exist on the tract.

WILDLIFE AND FISHERIES

Two endangered species, the bald eagle and peregrine falcon have been observed on the tract but are believed to be migrants or visitors rather than residents (DNRC, 1978). No other threatened or endangered animals are known to occur on the tract.

Golden eagles and prairie falcons are permanent residents on the tract. The eagles gather in the area during the winter for the good hunting and cover provided by the broken rolling grasslands.

The tract has one sharptail grouse dancing ground that has had no activity since 1979 and is suspected to have been abandoned (DNRC 1980).

Pronghorn habitat and resultant populations are the most important wildlife values on the tract. The area shown on map 3 is used year round and contains essential winter range and kidding areas. The pronghorn that winter and are raised on the tract provide a significant portion of the animals for a large area. Exact information on the amount of hunting provided by the herd is unknown but it is a significant amount (Stoneberg, personal communications). The pronghorn harvest date for hunting District 650 which encompasses the tract is listed below (FW&P, 1980).

Year	Total Calculated Kill		% of	Rank in
	Region 6	District 650	Region	Region
1977	2,133	616	29	1
1978	948	244	26	1
1979	1,069	130	12	6

The reduced harvests in the last two years reflect the severity of the 77-78 and 78-79 winters which resulted in fewer pronghorn permits being issued. Very few white-tailed deer are residents on the tract (DNRC, 1980).

There are no known fish species of special concern on the tract (Needham). There are no public access fishing ponds managed by state or federal agencies on the tract.

About 60 percent of the tract is drained by Nelson Creek. Timber Creek drains the rest of the tract. Both creeks are rated 4 (Limited Fishery Resource) on a scale of 1 to 5 (FW&P, 1980). Both game and forage fish from the Big Dry Arm of Fort Peck Reservoir use the lower sections of this and other creeks as spawning and nursery areas (Needham, 1980).

CULTURAL RESOURCES

The Circle West II tract has not been inventoried to date. Information from existing inventories (BLM unpublished data, Davis, 1976; Greiser, 1980) outside the Fort Union coal region suggests that the predominant prehistoric sites should be lithic scatters of varying size, density and function (ca. 70-80%). Other expected prehistoric resources include stone circles (ca. 10%-20%), ceramic bearing sites, rockshelters and kill sites (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic grafitti and rock art (ca. 20%), freight roads, dugouts, cairns, trading posts, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

Industry-sponsored inventory in the Circle West II tract is tentatively scheduled for the summer of 1981, to generate information sufficient to identify and predict the nature, occurrence and significance of cultural resources in the regional EIS. Subsequent to inventory and prior to the regional EIS, BLM will apply unsuitability criterion 7 (43 CFR 3461.1(g)) to all identified properties and will consult with the Montana State Historic Preservation Officer (SHPO) and the Advisory Council on Histori Preservation (ACHP) regarding the effect of coal leasing on National Register and/or eligible properties in accordance with the ACHP Programmatic Memorandum of Agreement with BLM, OSM and USGS, and Section 106 of the National Historic Preservation Act (P.L. 89-665 as amended).

VISUAL RESOURCE MANAGEMENT

During a previous study, this tract was evaluated as having a low scenery quality. The area does not support any unique physical or vegetative features. One could classify the landscape as rough and tremendously irregular. A complicated system of drainages dominates the entire tract. There are no visual intrusions within the study area.

ECONOMICS AND SOCIAL CONDITIONS

Existing and forecasted population and employment levels for the communities of Glendive, Savage, Lam-

bert, and Circle, Montana are shown in Figure 4 (in Chapter III). As this figure shows future population levels in these communities without energy development (refer to dashed line) are expected to either decline somewhat or remain relatively stable from 1981 through 2000.

These communities are small agriculturally oriented towns which do not have the capability to accommodate any significant population growth without some strain on public services. As Figure 2 shows, some of the above communities are presently (1981) experiencing some problems in providing an adequate or barely adequate level of one or more types of public services. For example, Savage is currently experiencing inadequate sewage treatment and collection facilities for its present population.

McCone County respondents mentioned the shortage of recreational facilities and programs, the need for improved road maintenance, and the lack of retail opportunities as the major service shortfalls in the area. Dawson County residents believe that the lack of retail opportunities, shortage of recreation and entertainment opportunities, and inadequacy of medical care are the existing major service problems.

Roughly 2/3 of the nineteen persons interviewed in McCone County supported mining in the area. The reasons given are the need for local economic growth, need for jobs, the nation's need for the energy, and the efficient use of an available resource. The concerns of both proponents and opponents of development center on reclamation of the land. Other concerns include presence of newcomers in the area and the attendant problems of crime, tax deficits, loss of air quality and aesthetics, and the way of life that presently exists.

While these levels of support appear to be quite high, this does not necessarily mean that residents are willing to unconditionally accept expanded mining in the area. Much of this support is qualified by concerns about the potential scale and locations of development.

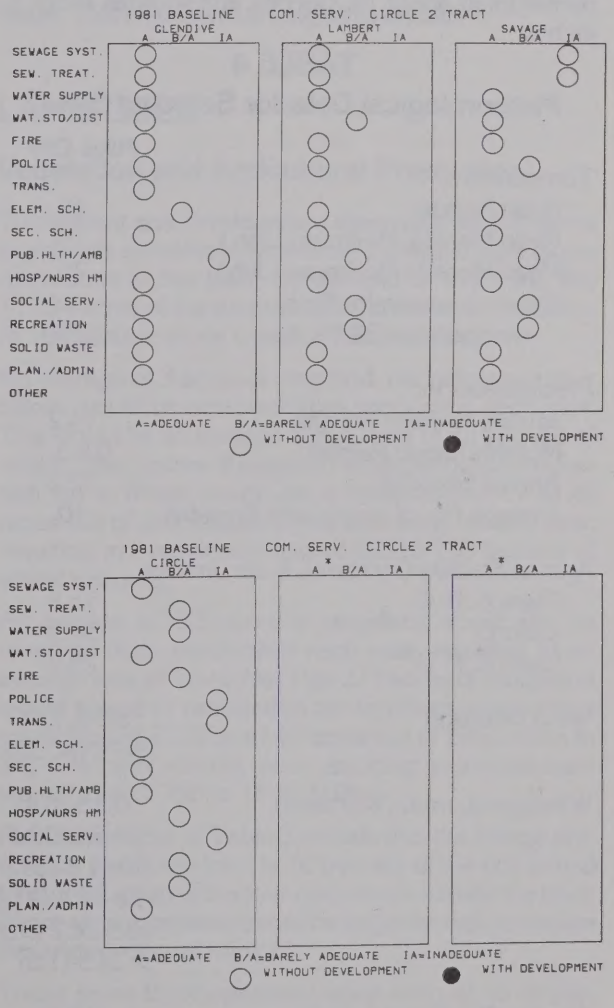
In Dawson County, a higher proportion of the thirty-six interviewed residents favored development either directly or with some qualification (e.g., the necessity for reclaiming the land). National energy and economic needs, along with the attractiveness of local jobs, were given as the main reasons for supporting development.

McCone County leaders were much more reserved in expressing their position toward development than were persons in the general population. The majority were neutral or uncertain toward development with concerns expressed toward the area's ability to deal with the population effects of development. Included are such concerns as presence of large number of construction workers, law enforcement and crime problems, and the ability of the school system to adapt to the change brought on by population growth. In Dawson County, support by leaders for development was very high and the leaders gave the same reasons generally as those persons interviewed from the general population. Similarly, the concern about reclamation was strong among leaders, as it was in the general population.

In both McCone and Dawson counties, the social atmosphere was mentioned by residents as the major benefit of living in the area. Informal relations among people, systems of mutual support and trust, friendliness, and similar factors were mentioned as the best things about life in these counties.

The lack of shopping opportunities appears to be widely perceived as the major drawback to living in the area, along with the long, hard winters.

FIGURE 2



SOURCE: Respective city/county or regional planners.

CLIMATE AND AIR QUALITY

The semiarid climate of east central Montana, which is typical of the Northern Great Plains, results from the area's extreme inland location. Rapidly changing meteorological conditions are common because of the movement of Pacific and Arctic pressure systems through the region.

The climate station utilized for meteorological data for the proposed lease tract is at Miles City (Table 4).

The annual mean temperature in the area is 46°F. The highest monthly mean temperature is 75°F (in July), and the lowest monthly temperature is 15°F (in January). The growing season averages 158 days at Miles City.

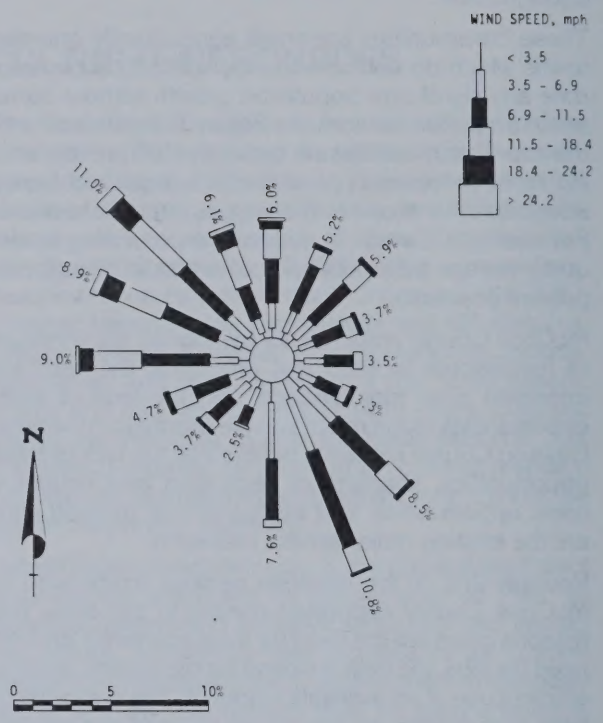
Precipitation in the area is quite light. Most of it is in the form of rain in late spring and early summer. Annual rainfall totals about 14.2 inches, and snowfall about 32 inches.

TABLE 4
Meteorological Data for Selected Sites*

	Miles City
Temperature, °F	
Mean Annual	46
Mean Monthly Minimum (Jan.)	15
Mean Monthly Maximum (July)	75
Growing season for Grass (temperature 32°F), days	158
Precipitation, in.	
Annual Average Rainfall	14.2
Monthly Range Rainfall	0.5-3.1
Annual Snowfall	32.2
Average No. of mo/yr with Snowfall	10
Annual Stability (by class), % occurrence	
Class A, B, C	15.8
Class D	54.3
Class E, F, G	29.9
Wind Direction	SE-S, 27% W-NNW, 35%
Windspeed, mph (% of time)	0-3.5 (8.4) 3.6-6.9 (23.3) 7.0-11.5 (39.6) 11.6-18.4 (21.3) 18.5-24.2 (5.5) >24.3 (1.8)
Average Windspeed, mph	10.6

*Sources: National Oceanic and Atmospheric Administration, 1980
Powder River Site Specific Analysis, 1981

FIGURE 3



Miles City Wind Rose

Wind data used in this analysis were obtained at Miles City, the only station in the area that had data suitable for input into the dispersion model used. The wind rose in Figure 3 represents a summary of these data. Winds are predominantly from the W to NNW 35 percent of the time and from the SE to S, 27 percent. Windspeed averages 10.6 mph annually and exceeds ll.5 mps 28.6 percent of the time. Although the terrain offers little obstruction to the dispersion of pollutants, the area experiences prolonged periods of depressed mixing heights and low windspeeds, which tend to concentrate pollutants.

According to total suspended particulates (TSP) monitoring data, annual geometric means in this area is 25.9 ug/m^3 and the arithmetic mean is 42.5 ug/m^3. The sparse population in the area precludes consideration of the sampler as an urban impacted site. The background level for this analysis was determined to be 42.5 ug/m^3.

No Class I areas fall within the impact range of the proposed tract. Visibility in the area ranges from 45 to 70 miles.

CHAPTER III
ENVIRONMENTAL CONSEQUENCES

TOPOGRAPHY

Evidence of mining and reclamation would result in less contrasting topography.

GEOLOGY

Production through life of mine is estimated at 245.7 million tons of lignite. During this time the tract would be temporarily committed to a single use.

The lignite removed by mining, 245.7 million tons, and that portion unrecoverable by current mining techniques, an additional 27.3 million tons, would be lost from future use.

SOILS AND RECLAMATION POTENTIAL

The proposed action would have a significant short-term impact on the soil in the tract (see Table 1). By the end of mine life, 11,024 acres would be disturbed.

Soil impacts include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, and soil compaction from haul roads.

In the tract, 56 percent of the soil has a high potential for wind erosion and 48 percent of the soil has a high potential for water erosion. The clay content of the overburden would be a problem. More sampling and analysis will be required to determine the need for selective handling of the spoils to meet state-federal guidelines (see Table 1). Proper seeding of the stockpiles would reduce this erosion potential.

Disturbances of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships, and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil. Salinity content would increase as a result of the lower calcareous horizons being brought to the surface.

The reconstruction potential is determined by the soil hazard condition. The tract is rated as 2 percent good, 56 percent fair and 41 percent poor for reconstruction. Suitability of the soil material for plant growth is rated as 8 percent good, 26 percent fair, 34 percent poor and 32 percent unsuitable (see Table 1). The soils rated poor can be reclaimed, but would require more intensive and costly management to be revegetated and stabilized. In the long-term, the impacts to the soil would not be significant.

HYDROLOGY

No substantial impact to surface water is expected because of mining or development of potable water supplies. Mining and use of water for mine industrial supply would cause destruction of three known stock wells within the tract. Five known stock wells and two known domestic wells outside of the tract could suffer lowered water levels during the mining operation; additionally, the chemical quality of ground water in these wells could be degraded following mining and reclamation owing to groundwater migrating through the replaced mine spoils to the wells. Groundwater in the spoils is expected to have dissolved solids contents 1,000 to 3,000 mg/l higher than the native groundwater. This represents a long-term impact.

LAND USES

Vegetation and Agricultural Production

The leasing and development alternative would have a significant short-term impact on individual agriculture operations in the tract. By the end of the mine life, 11,024 acres of the tract would be disturbed, in addition to 160 surface acres used for mine facilities.

An average of 3 acres of cropland, excluding summer fallow, would be removed from production each year. This would be an average annual loss of 85 bushels of wheat. This 3 acres of cropland would be out of production ten to fifteen years with a maximum of 17 to 26 acres out of production in any one peak mining year, resulting in a maximum loss of 483 to 738 bushels of wheat annually.

An average of 273 acres of rangeland would also be removed from production each year, resulting in an average loss of 76 AUMs. This 273 acres of rangeland would be out of production ten to fifteen years with a maximum of 2728 to 4146 acres out of production in any one peak mining year, resulting in a maximum annual loss of 756 to 1148 AUMs.

Further analysis of Table 3 reveals that the forage production inside the tract is 16 percent of the combined total production of the four operations outside the tract. Three of the operations may be large enough to survive the impact of coal mining.

These same three operators lease from 41 to 68 percent of their in-tract land holdings. There are 4,911 acres of land leased for livestock grazing in the tract, representing 44.5 percent of the tract area. The operator with no leased land has 70 percent of his total operation inside the tract. The other operators vary

from having 6 to 21 percent of their total operations inside the tract (see Table 3).

Regionally, these losses would not pose significant reductions in area agricultural production. Analysis of economic impacts, both to individual operations and regionally, will be forthcoming under separate cover. Chief items of concern on the tract are the riparian shrub subtypes. These areas are vital to many wildlife species especially mule deer, and there is concern that they can be restored after mining and subsequent reclamation.

The Montana Department of State Lands will set the standards for establishing a diverse and effective permanent vegetation cover on all rangeland areas, with coordination and cooperation from the Office of Surface Mining and the Bureau of Land Management.

Agricultural Economics

This section will be forthcoming under separate cover.

Residential Homes

There are no residential homes or other buildings located within the tract.

Transportation and Access

Access is available to the tract from Highway 24 and 200 over primitive seasonal jeep trails. These trails would have to be upgraded and roads constructed for access to the mine facility for year round and heavy equipment use.

The major impact on the present transportation system due to mining would be an increase in volume on existing transportation modes. This would result in increased accident rates, system deterioration, rising maintenance costs, and decreased efficiency if not mitigated.

The increased highway use would also lead to accelerated deterioration, and thus a reduction in capacity, especially for Highways 200 and 24. Accident rates would increase due to the increased volume; however, system deterioration would also increase public expenditures required for maintenance or reconstruction.

Traffic volume on Highway 200 and 24 would increase proportionately to construction and mining activities. Fluctuations would occur relative to the degree of overlap between mining and construction activities. Traffic is expected to be heavy when shift changes occur.

Existing Rights-of-Way and Needs

Rights-of-way will be needed for access roads across federal, state, and private lands to the mine facility. In addition, rights-of-way would be needed for approximately 21 miles of out-of-pit haul roads, most of which are outside the tract boundary.

Recreation

Sportsmen would be denied access during the mining period. After reclamation one would expect a return to prior use patterns. Improved road access may stimulate additional recreation interest, but surface control by ranchers will dictate actual use limits. New mine employees will undoubtedly inflict recreation pressure on public land throughout the region.

WILDLIFE AND FISHERIES

Mining the tract would have no significant impact on the sharp-tailed grouse or white-tailed and mule deer populations, as essential habitat does not occur on the tract and alternate habitats are available. The peregrine falcon and bald eagle would not be impacted either; they would avoid the activity area during their migrations.

Displaced wintering golden eagles should be able to find enough open ground for hunting territories in areas surrounding the tract.

The essential habitat for pronghorns (map 3) will be considered when unsuitability criteria is applied. If not declared unsuitable, there would be significant, long term impacts. The area is so important that the herd would probably die off. If reclamation is adequate and past mining land use does not change, pronghorns may be able to be reestablished by stocking and careful management.

Poaching and road kills have increased dramatically in areas of Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where shift changes coincide with feeding periods, especially big game (Streeter, et al., 1979). The same would probably occur in this area.

Actions to mitigate these impacts available to entities other than BLM would be to provide mass transportation of workers and adjusting the times of shift changes which would greatly reduce poaching. This has been used successfully in other mining areas (Streeter, et al., 1979). Providing funds for the Montana Department of Fish Wildlife and Parks for increased law enforcement or adaption of a poaching clause in union contract would also help.

Increased traffic would result in road kills of antelope as well as further destruction of habitat. As a result of disturbance and the reductions in wildlife numbers through direct mortality and habitat destruction, recreational opportunities such as wildlife viewing and hunting would be greatly reduced in the area around the mine.

CULTURAL RESOURCES

All cultural resources within the tract would be subject to direct impact from construction of mine and powerline facilities, haul roads, water development, and mining activity. Cultural resources not immediately impacted by the above activities are subject to impacts from increased erosion, access and vandalism. Direct impact would result in damage and destruction to cultural resources, artifacts, their immediate environmental context and the information these contain. Subsurface cultural resources not previously located by surface inventory would also be destroyed.

Should the tract be leased, a mitigation program would be undertaken for all affected cultural resources. Development of avoidance and preservation alternatives is preferred, as these would minimize impact to cultural resources. If these alternatives are not feasible, a scientific program of data retrieval will be developed and implemented for all cultural resources within the tract.

VISUAL RESOURCE MANAGEMENT

There would be little or no impact on visual quality, dependent upon design and elevation of road from Highways 24 and 200. The surface disturbance of 11,024 acres would be visible on-site, irrespective of rehabilitation efforts. Buildings, powerlines, roads, and mining equipment constitute visual intrusions of a different sort. Vehicular traffic and mining would stimulate dust and particle pollution.

NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM Washington Office Information Memo 80-640, July 7, 1980. Approximately 27.7 British thermal units (Btus) would be expanded to produce a pound of coal. That pound of coal, in turn, would produce about 7,460 Btus. The ratio of energy expended to that energy produced is 1 Btu/198 Btus.

ECONOMICS AND SOCIAL CONDITIONS

Construction and operation of the Circle II tract would result in impacts upon services in some communities within the areas as a result of population growth associated with employment opportunities. Figure 4 shows forecasted community employment and population levels through the year 2000 both with and without development of the Circle II tract. As this figure shows, Glendive, Savage, Lambert, and Circle, Montana would experience increases in both population and employment as the result of the development of the tract.

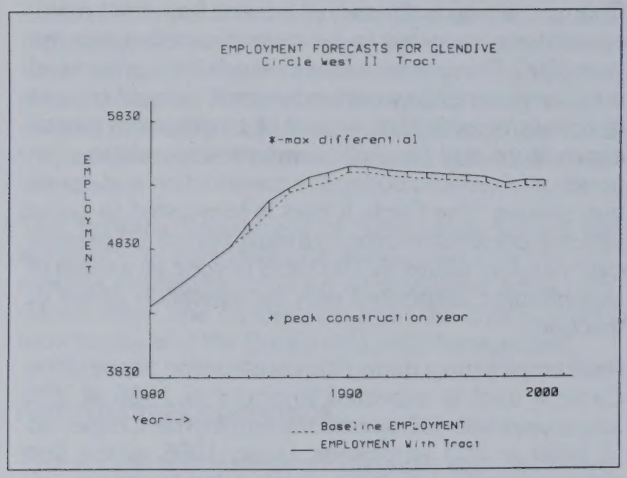
Changes in regional personal income from tract development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employment payroll expenditure and through company expenditures for goods and services during the construction and operation phases. The Circle II tract is forecasted to boost regional personal income by a maximum of 1.3 percent over baseline values by 1987 and beyond as a result of expenditures associated with the operation phase of this tract.

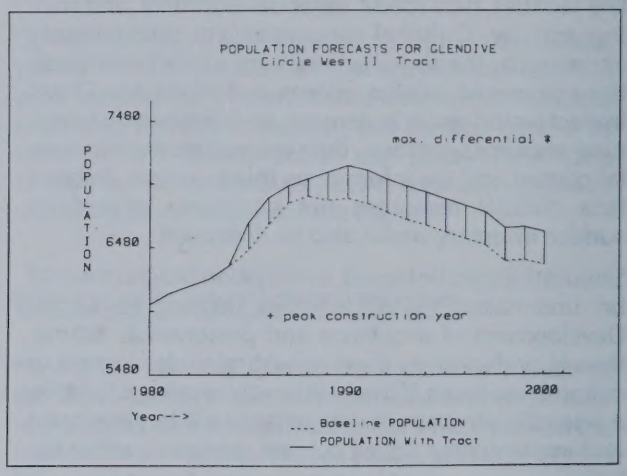
Peak employment during the construction phase of the Circle II tract is expected to occur in 1986 at 205 employees with full operations employment expected in 1989 at 290 employees. Using 1986 as the first primary impact date, it is estimated that the communities of Glendive, Savage, Lambert, and Circle would experience an inadequate level of one or more community services as a direct result of the 1986 peak construction employment/population levels (Figure 5). Glendive, for example, is forecasted to face an inadequate water supply situation as a result of population growth attributable to the construction of the Circle II tract. Additionally, Fairview, Richey, Sidney, Brockway and West Glendive would experience an inadequate level of some community services by 1986 without tract development. A tract-related population influx in these communities would further exacerbate an inadequate service situation, however, the inadequacy of these services would not be a direct result of tract development.

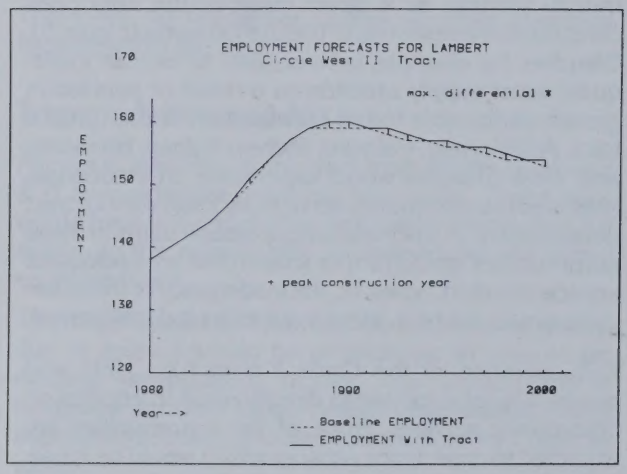
Full operation of the Circle II tract (i.e., 1991 and beyond) is not expected to directly result in impacts on community services. None of the communities are expected to experience services which would be inadequate as a direct result of the population influx resulting from tract operation. However, the following communities in the study area are forecasted to face inadequate public services by 1991 even without tract development: Richey, Glendive, West Glendive, Sidney, Savage, Lambert, Fairview, Brockway, and Circle. Development of the Circle II tract would further worsen an inadequate service situation.

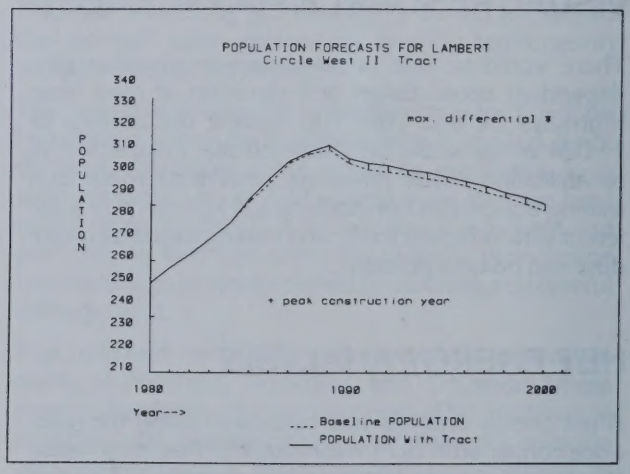
The adequacy ratings appearing in Figure 5 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1986 and 1991. Several of the services appearing in the community service graphics are of greater important than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/dis-

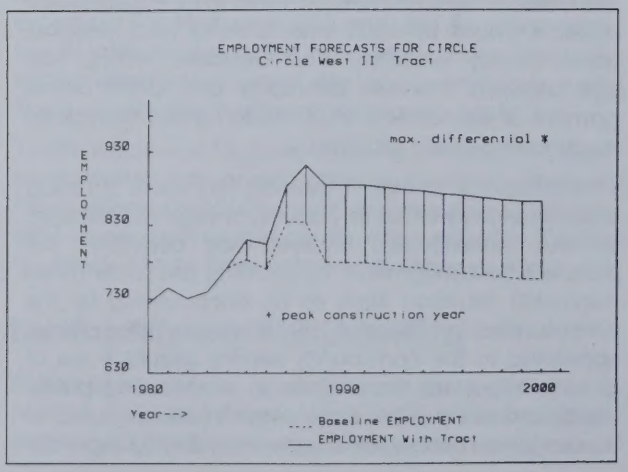
FIGURE 4


EMPLOYMENT FORECASTS FOR GLENDIVE
Circle West II Tract
EMPLOYMENT
5830
4830
3830
*-max differential
+ peak construction year
1980
1990
2000
Year-->
---- Baseline EMPLOYMENT
___ EMPLOYMENT With Tract


POPULATION FORECASTS FOR GLENDIVE
Circle West II Tract
POPULATION
7480
6480
5480
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline POPULATION
___ POPULATION With Tract


EMPLOYMENT FORECASTS FOR LAMBERT
Circle West II Tract
EMPLOYMENT
170
160
150
140
130
120
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline EMPLOYMENT
___ EMPLOYMENT With Tract


POPULATION FORECASTS FOR LAMBERT
Circle West II Tract
POPULATION
340
330
320
310
300
290
280
270
260
250
240
230
220
210
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline POPULATION
___ POPULATION With Tract


EMPLOYMENT FORECASTS FOR CIRCLE
Circle West II Tract
EMPLOYMENT
930
830
730
630
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline EMPLOYMENT
___ EMPLOYMENT With Tract

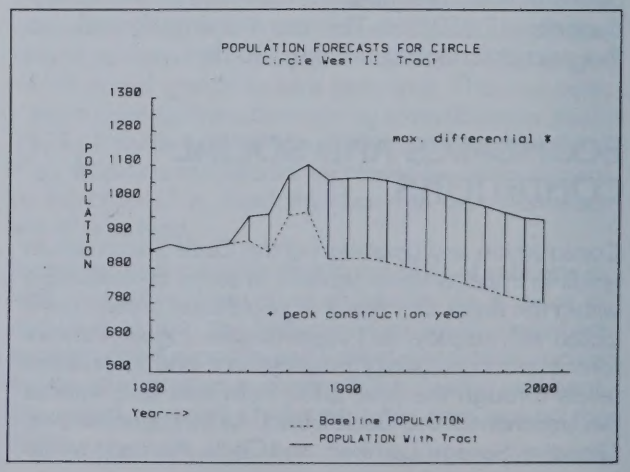
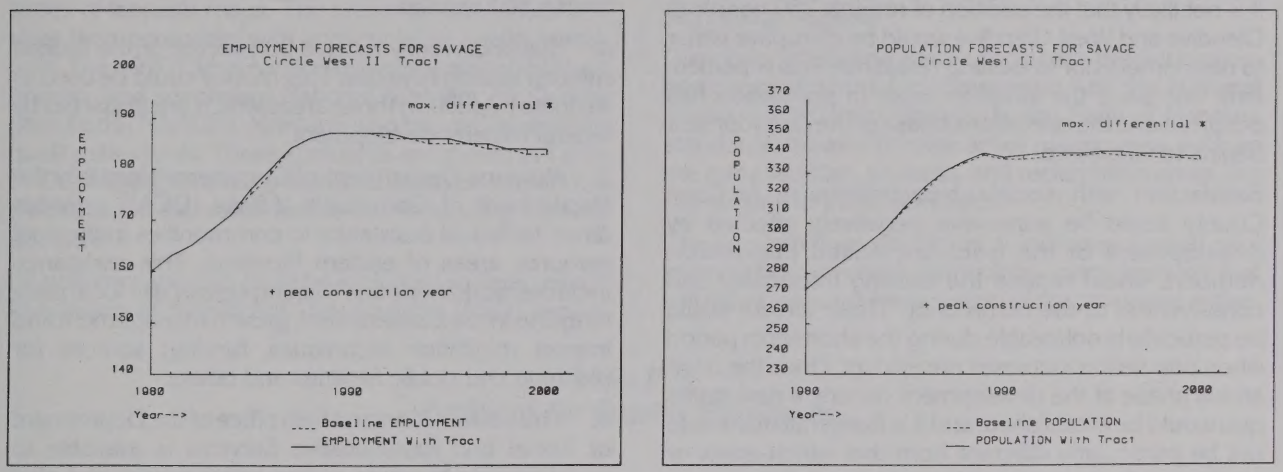
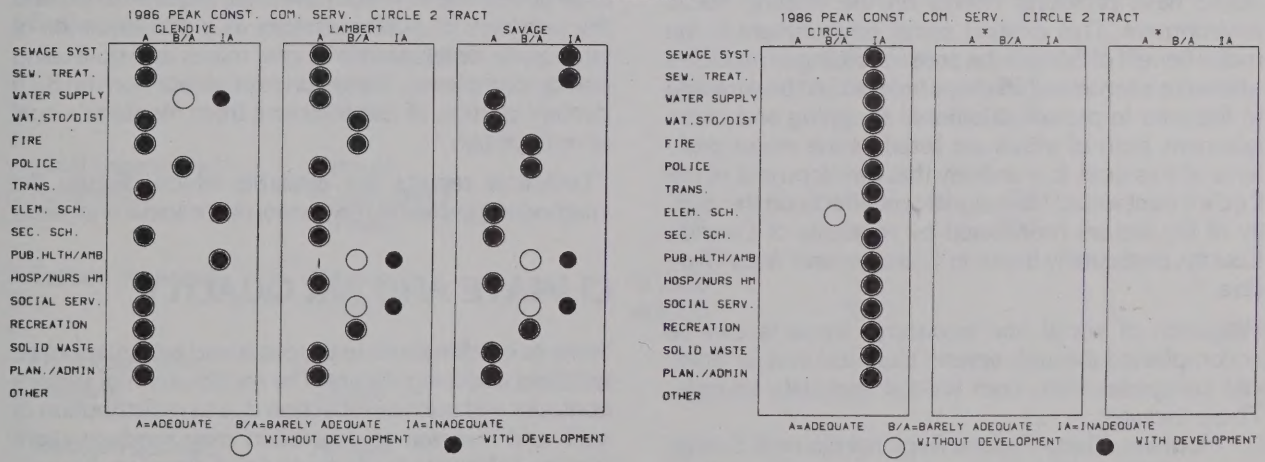

POPULATION FORECASTS FOR CIRCLE
Circle West II Tract
POPULATION
1380
1280
1180
1080
980
880
780
680
580
max. differential *
+ peak construction year
1980
1990
2000
Year-->
---- Baseline POPULATION
___ POPULATION With Tract

FIGURE 4



SOURCE: Mountain West Research, Inc., 1981.

FIGURE 5



SOURCE: Respective city/county or regional planners.

tribution, health care and police/fire protection are of more immediate concern to community well-being than are nonbasic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its nonbasic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these types of services

The community of Circle would be most profoundly effected by development of the Circle II tract. Its population base would be roughly 30 percent above the level projected without development. This is substantial in a community that presently is relatively homongenous socially. Given the area's slow decline in population in the last several decades and its lack of experience with development, it is likely that McCone County residents would clearly notice changes in the social atmosphere of the community in which they live. Newcomers residing in Circle and McCone County would, at least over the short-term, probably exhibit different interests, values, and concerns than do present residents. This would likely be seen by many residents as disruptive. In the long-term it is likely that the work force associated with the proposed mine would be successfully assimilated into the political, religious, and family life of the community.

Glendive and West Glendive would experience population changes due to development of the Circle II tract.

However, in a relative sense, these changes would be much less significant than in Circle. Glendive and West Glendive have had some exposure to development and are more socially and economically diverse. Therefore, it is not likely that the addition of roughly 350 people in Glendive and West Glendive would be disruptive either to newcomers nor to existing residents. This is particularly true once the initial increase in population has occurred and the operations phase of the development begins to take place.

Satisfaction with social characteristics in McCone County could be somewhat negatively affected by development of the tract. Increased population numbers would reduce the existing informality and cohesiveness of the community. These effects would be particularly noticeable during the short-term period when population increases are evident. Once the operations phase of the development occurs, a new status quo would be established, and it is likely that this would not be particularly different from that which exists or would exist in the future without development.

In Glendive and West Glendive (Dawson County) it is not expected that development of the Circle II tract would have profound effects on the existing social environment. This existing social environment is the major benefit of living in the area according to residents who were interviewed. Perhaps firms would be attracted to the area to provide additional shopping and entertainment, both of which are listed as the major problems at this time. It is unlikely that development of the Circle II tract would have significant effects on the quality of life factors mentioned by residents of Dawson County, particularly those in Glendive and West Glendive.

Mitigation of social and economic impacts can be accomplished through several technical and/or financial categories from both federal and state sources. These include:

1. Mountain Plains Federal Regional Council Energy Impact Office. This office has several functions designed to alleviate impacts on counties and communities, including: (a) provide information about and facilitate applications for technical and financial assistance, (b) develop and participate in workshops for state, local, federal, and industry people on impact assessment and mitigation, (c) encourage and facilitate development of local energy impact assessment task forces.

2. HUD, USGS, DOE, EPA and Department of Labor are all active in sponsoring advanced planning and mitigation assistance. However, because of federal budget cuts, it is unclear whether any federal agencies will be committed to providing technical assistance to state and local governments in energy impacted areas.

3. The Farmers Home Administration (FmHA) 601 Program provides grants to designated (approved) coal impact areas for planning, site acquisition, and development of public facilities and services in addition to housing on sites owned by a city or county. However, currently there are no Montana counties in the Fort Union Region which are designated as being eligible for FmHA 601 monies.

4. States currently receive 50 percent of the federal mineral leasing royalties. This money could be used to mitigate impacts in those areas which are impacted by federal mineral development.

5. Montana Department of Commerce (formerly the Department of Community Affairs (DCA)) provides direct technical assistance to communities in the coal resource areas of eastern Montana. This assistance includes workshops and training sessions in local planning and impact assessment, growth management and impact migitation techniques, funding sources for planning and public facilities and others.

6. The eastern Montana field office of the Department of Social and Rehabilitative Services is available to assist eastern Montana communities assess and plan for human service impacts.

7. Funding by the Montana Coal Board is available to local governments which have been required to expand the provision of public services as a consequence of large scale development of coal mines and coal-using energy complexes. These funds originate from an 8.75 percent portion of the revenues from Montana's coal severence tax.

"Technical reports are available which discuss the methodology used in the economic or social analyses."

CLIMATE AND AIR QUALITY

Impacts on climate from the proposed action would be localized and insignificant. The modification of surface contours and surface reflection due to redistribution of soils and removal of vegetation may produce slight localized changes in windspeed and direction, temperature, and humidity. Reclamation with reestablishment of vegetation would largely mitigate these impacts over the long term.

The methodology for determining the air quality impact of particulate emissions consisted of (1) obtaining mine profiles for each tract from the U.S. Geological Survey (USGS), (2) obtaining emission factors for individual surface coal mining operations, (3) using the mine profile and emission factors for calculations of total emissions, (4) entering the emission data into a modified climatological dispersion model (CDMQC) for prediction of ambient concentrations, and (5) comparing predicted concentrations to National and State air quality standards and to Prevention of Significant Deterioration (PSD) increments. The air quality impact was analyzed for the peak production year.

Details about the CDMQC model, emission factors, and their application appear in a technical report available from BLM.

The results of the modeling exercise were plotted on a series of isopleth maps. The predicted concentrations were then compared with applicable air quality standards. The 1970 Clean Air Act Amendments established primary and secondary National Ambient Air Quality Standards (NAAQS). Montana also has established air quality standards. These standards are shown in Table 5. The Montana primary standard for total suspended particulate is the same as the corresponding Federal standard.

All pollutant sources must be evaluated to determine if Prevention of Significant Deterioration (PSD) regulations apply. These standards are also shown in Table 5.

During the peak production mining period, total particulate emissions from the proposed action are predicted to be 2213.4 tons per year, with best available control technology applied.

Dispersion modeling was performed to predict particulate concentrations for comparison with the National Ambient Air Quality Standards and State of Montana standards. Areas within the active mining area, such as the mine facilities, pit areas, and reclamation areas, are not subject to these standards.

The isopleth lines on Figure 6 indicates annual geometric mean average particulate concentrations that will result from implementation of the proposed action.

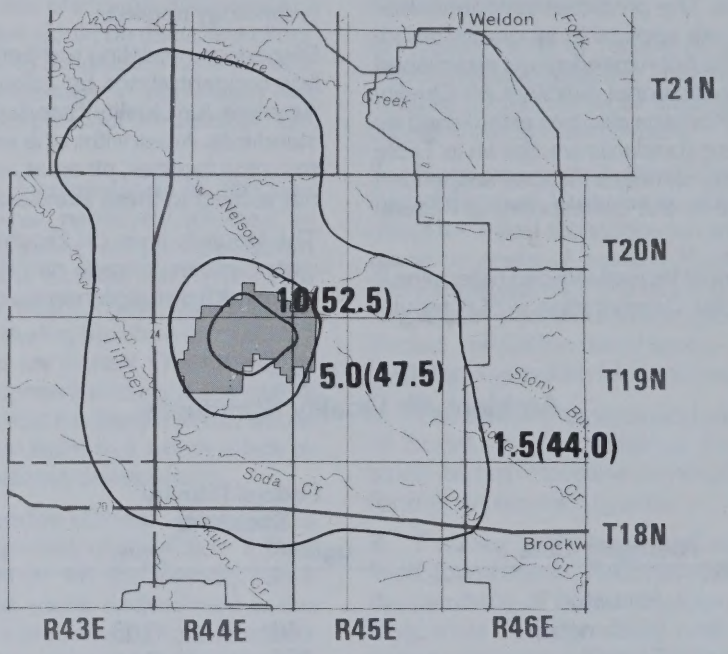
TABLE 5
Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards ug/m³	Federal Primary Standards ppm	Montana State Standards ug/m³	Montana State Standards ppm
Sulfur Dioxide	Annual (Arithmetic)	80	0.03	60	0.02
	24-hour	365	0.14	260	0.10
	3-hour			650	0.25
Total Suspended Particulate	Annual (Geometric)	75		75	
	24-hour	260		200	
Carbon Monoxide	8-hour	10,000	9		
	1-hour	40,000	35		
Photochemical Oxidant	1-hour	240	0.12		
Nitrogen Dioxide	Annual	100	0.05		
Lead	3-month	1.5			

Prevention of Significant Deterioration (PSD) Regulations

Class II area	ug/m³
Sulfur Dioxide	
Annual Arithmetic mean	20
24-hour maximum	91
3-hour maximum	512
Particulate matter	
Annual Geometric mean	19
24-hour maximum	37

Source: National Ambient Air Quality Standards 1970; Montana State Department of Health and Environmental Sciences.



Scale 1:500,000

10 0 10 20 Miles

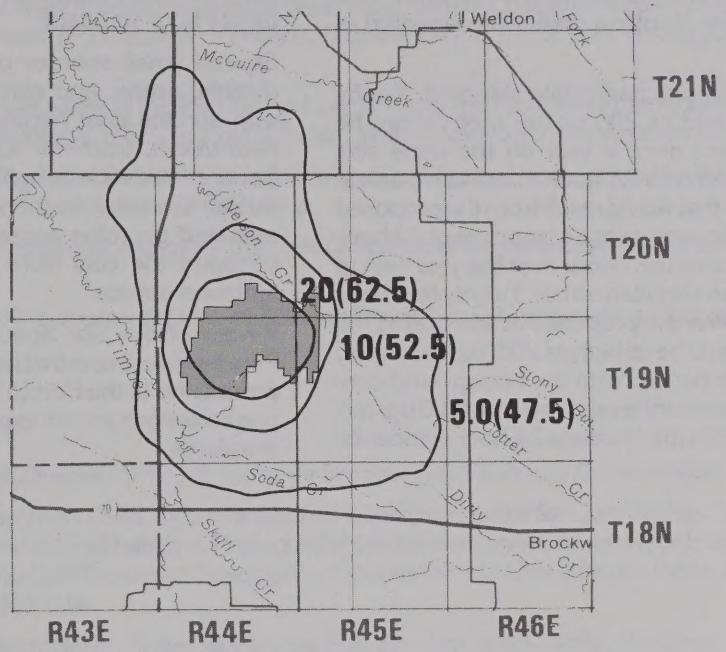
Circle West II Tract

TSP Annual Average Concentration (ug/m^3) Isopleths

-N-

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 6



Scale 1:500,000

10 0 10 20 Miles

-N-

Circle West II Tract

TSP Maximum 24-hour Concentration (ug/m^3) Isopleths

Note: Number in parenthesis indicates predicted concentration plus background concentration.

FIGURE 7

During peak coal production, the highest annual geometric mean concentration at a location off the mine site would be 8.9 ug/m^3. With a background concentration of 42.5 ug/m^3, the highest annual geometric mean ambient concentration would be 51.4 ug/m^3. This value is less than the Montana particulate standard of 75 ug/m^3.

In addition to the annual particulate standard, Montana's 24-hour standard of 200 ug/m^3 that cannot be exceeded more than once a year off the mine site. Figure 7 shows predicted 24-hour maximum particulate concentrations that would result from the proposed action. The isopleths represent a composite of 24-hour levels; therefore, the values occur over the year period indicated rather than simultaneously. Twenty-four hour maximum values with the proposed action during full coal production would be as high as 25.5 ug/m^3 during the end of mine life period. With the background concentration added, ambient levels would be 68.0 ug/m^3. These levels are within the Montana 24-hour standards.

In addition to the annual and maximum particulate standard, Montana has a PSD incremental standard of 19 ug/m^3 annually and 37 ug/m^3 for a 24-hour maximum which cannot be exceeded more than one time per year. The proposed mining activity will not violate the 24-hour standard.

Several small sources of gaseous pollutants (sulfur dioxide, ozone, and nitrogen dioxide) are associated with surface coal mining operations. These include haul trucks, front-end loaders, scrapers, and dozers. Sources also include light-duty vehicles (chiefly pickup trucks) operated in the mine and employee vehicles operated on mine access roads. Unit trains used to transport the coal from the site are also a gaseous emission source.

Review of the Site Specific Analysis Reports for the Powder River tracts that had similar tons per year of coal production to the Fort Union tracts indicates that gaseous emissions are not expected to violate any air quality standards.

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SUMMARY MATRIX
CIRCLE WEST II TRACT
Resource and Environmental Considerations

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Topography	Narrow divides separated by steeply incised drainages.	Less contrasting divides and wider, flatter drainages. Original drainage pattern would be reestablished.	Low	Good	
Geology and Minerals	Tract is underlain by formations that are prospectively valuable for oil and gas. There are no known wells on the tract.	None	None	Acceptable	
	Tract contains 275.0 million tons of coal.	Loss of 27.3 million tons of coal for future use by current recoverable techniques.	Low	Good	
Soils and Reclamation Potential	There are 35 soil series in the tract mapped at level II in a survey done by Soil Conservation Service which are found along undulating to hilly and steep, dissected sedimentary plains.	There will be displacement of soil by water and wind erosional forces; change in soil structure and natural fertility problems in revegetation and stabilization on steep slopes.	Significance of the impact will be high. Reconstruction potential is rated as 56 percent fair and suitability of soil material for reclaimability is rated as 34 percent poor and 32 percent unsuitable.	Data reliability is 90 percent from the McCone County Soil Survey.	
Hydrology Surface Water Quantity	The tract is drained northwestward to Ft. Peck Reservoir by Nelson Creek & its tributaries. The southernmost part of the tract is drained southward by tributaries of Timber Creek. Both flow in response to thunderstorms & snowmelt. The estmated annual yield of Nelson Cr. at the western boundary of the tract is 1120 ac. ft.	No substantial impact to surface flows is anticipated.	Small	Fair-Good	
Quality	Storm runoff generally ranges from 200 to 800 mg/l in dissolved solids & the water would likely be a calcium bicarbonate type. Low flows would be a sodium sulfate type ranging from 800 to 6000 mg/l in dissolved solids.	No substantial impact to surface flows is anticipated.	Small	Fair-Good	
Alluvial Valley Floors & Flood Plain	No alluvial valley floors are known to occur on tract.	None	None	Good	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Groundwater Use in tract	3 stock wells exist within the tract, all completed in the Tongue River aquifer.	All wells will need to be redrilled after mining, if needed.	Minimal cost to mining company to redrill wells.	Good	
Quantity	In near-surface aquifers, groundwater flows toward Nelson Cr. & Ft. Peck Reservoir. In the deeper aquifer groundwater flows northeastward. Yields from wells in tract range from 3 to 70 gpm but most yield 3 to 10 gpm.	Mining might lower the water levels in 5 stock wells and 2 domestic wells outside the tract.	Possibly significant if water levels drop in nearby wells, especially the domestic wells.	Good	
Quality	Groundwater from Tongue River aquifer is a sodium sulfate to sodium bicarbonate type & dissolved solids range from 1000 to 4000 mg/l.	The chemical quality in wells down gradient of the tract could be degraded.	Possibly significant if chemical quality degradation occurs in irrigation wells.	Good	Groundwater in the reclaimed spoils is expected to have dissolved solids content 1000 to 3000 mg/l higher than the groundwater.
Vegetation Rangeland Types: Prairie County. Grassland with influences from Central Grassland	Native Vegetation covers 99% or 1091 acres of the tract. Primary land use is by livestock, with small cropland areas. Vegetation provides food & habitat for wildlife, retards erosion, and improves air & water quality	Vegetative Subtypes and Acres to be Disturbed: Grassland - 7,574 Big Sagebrush - 39 Silver Sagebrush - 2,883 Riparian Shrub - 415 Total Acres 10,911	High - due to long term elimination of established plant communities & reduction of species diversity. Reservoirs & shallow underground waters will be highly impacted by surface mining.	Data Reliability 95% from the McCone Co. ASCS Committee Reliability determined by cross-checking data received. There is no data at present as to the kind and number of wildlife that depend on the vegetation on the tract.	Many native plant species may be lost through mining. The impact may be lessened by immediately respreading topsoils. Impacts will extend past the 40-year life of the mine.
Livestock Forage in Animal Unit Months (AUM) (McCone Co. Average)	Average Production is 3,022 AUMs.	Average annual loss of 76 AUMs. Each acre would be out of production from 10 to 15 years. Maximum loss for any one peak mining year would be 2,728 to 4,146 acres and 756 to 1,148 AUMs.	Moderate to high depending upon individual operation. Low to moderate for overall tract.	Grazing data from the McCone Co. Conservation District's Long Range Program, circa 1976.	
Threatened or Endangered Plants	There are no reports of threatened or endangered plants in the coal tract area.	Low	Low	Good	No plants in Montana have been accepted as yet by the FWS for inclusion on the Threatened or Endangered Plants List.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Noxious Weeds	There are 6 noxious weeds in the Circle Planning Unit. Only Canada Thistle & Leafy Spurge have been reported on or near the tract. The other plants are: Russian Knapweed, Field Bindweed, White top, Snowy Milkweed	Low to Moderate	Low to Moderate	Data obtained from the Circle Planning Unit documents developed in 1978.	The impact depends on whether mining operations disturb noxious weeds before or after seed has been produced and how topsoils containing noxious weed roots are handled.
Agriculture	There are 113 acres of land in the tract that are currently being cropped.	Average annual loss of 3 acres excluding 45 total acres of summer fallow. Annual production on this 3 acres would be 85 bu. of wheat. Maximum loss in any one peak mining year would be 17 to 26 acres and 483 to 738 bu. of wheat.	Moderate to high depending upon individual operation. Low to moderate for overall tract production.	Data reliability is 95% from the McCone County Agriculture Stabilization & Conservation Committee. Reliability of data determined by cross-checking data received.	
Land Use	No industrial activity. Ranching is primary use. Little or no farming. No residential homes.	Introduction of industrial activities. Land required for mines, roads, railroads and powerline rights-of-way. Land required for housing development and related support.	Moderate during mining. Low to none after reclamation.	Good	Existence of power lines, rail lines, and industry may encourage further development of area.
Wildlife					
Endangered Species Bald Eagle and Peregrine falcon	Migrate through area.	Insignificant	Insignificant	Good	
Sage grouse	Unknown	Unknown	Unknown	Non-existent	Should occur in pronghorn area.
Pronghorn	Year-round habitat plus essential winter range, kidding and recreation area.	If declared unsuitable, low insignificant. If not, the herd would be destroyed.	If declared unsuitable, low insignificant; if not, herd would be destroyed and there would be no recreation opportunities now being provided by herd. Long term, High-Negative	Good	
Fisheries	Water in Nelson and Timber Creek used for spawning and nursery areas for Ft. Peck Reservoir.	Game and forage fish in Ft. Peck reservoir may be reduced.	Low-Moderate. Big dry arm of Ft. Peck reservoir very important recreation area and is a National Wildlife Refuge. Fisheries would be reduced.	Good	
All Other Species	Insignificant	Insignificant	Insignificant	Good	

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
General	—	—	—	—	Increased poaching and disturbance would significantly reduce all wildlife populations in the region. If not controlled it would significantly reduce recreation opportunities.
Cultural/ Historical Values	Tract not inventoried to date. Industry-sponsored inventory tentatively scheduled for 1981. Expected prehistoric resources include lithic scatters (70-80%), stone circles (10-20%), ceramic-bearing sites, rockshelters kill sites (10% combined). Expected historic resources include homestead and ranch remains (50%), historic rock art (20%), freight roads, dugouts, cairns, trading posts, burials and battle sites (ca. 30% combined).	Direct impact to all cultural resources in the tract through damage and destruction and increased erosion, access, and vandalism.	Damage and destruction to sites, artifacts, their immediate environmental context and the data these contain.	Poor for tract.	Expected resources in tract have been extrapolated from the literature on reported sites in the Fort Union KRCRAs and inventory surrounding the Fort Union region (BLM unpub., 1980; Davis, 1976; Greiser, 1980 Johnson, 1977; Reeves, 1970).
Recreation	No facilities in tract; poor road access; dispersed hunting in the fall.	Improved road access to site. Hunting restrictions during mining period. Off-site pressure by mine employees.	Slight.	Poor	
Wilderness	N/A	N/A	N/A	N/A	N/A
Visural Resource Management	Rough terrain with numerous drainage coulees. Tract lacking in diverse vegetation. No intrusions noted.	Dust pollution from traffic and mining. Actual disturbance of 11,024 acres. Visual intrusions resulting from buildings, roads, equipment, power lines.	Short term- High Long term- Moderate	Fair	
Net Energy Analysis	7,460 Btus/lb.	The ratio of energy expended to that energy produced is 1 Btu to 198 Btus.			
Climate and Air Quality	Excellent	Minimal background addition. All applicable standards will be met.	Insignificant	Fair	

Economics and Social Conditions

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECTS OF LEASING	SIGNIFICANCE OF ANTICIPATED IMPACTS	DATA RELIABILITY	COMMENTS
Population/ Employment	Population/ Employment numbers appear in a stable or small increasing trend	Increases in: Glendive Circle Savage Lambert	Population/ Employment increases are high/moderate in Circle, moderate in Glendive, and low in Savage and Lambert.	Good	See Population and Employment Graphics in Chapter 3 for more detail.
Regional Personal Income	Regional personal income forecasted to increase moderately through the year 2000.	Slight increase in regional income from tract construction and operation.	Insignificant	Fair	
Infra-structure	Most services are adequate or barely adequate in Glendive, Savage, Lambert and Circle.	These communities would have 1 or 2 services which would become inadequate as a direct result of tract development.	Glendive - Moderate/high impact for water supply. Savage and Lambert Moderate/high impact for Public Health/Ambulance. Moderate/low impact for Social Services. Circle - Moderate/low impact for Elementary School.	Excellent	See Community Service Graphics in Chapter 3 for greater detail.
Resident Perception of Community Service	Problem areas: McCone County: a) recreation opportunities b) roads Dawson County: a) medical b) recreation opportunities	Not Applicable	Not Applicable	McCone - Good Dawson - Good	
Social Attitudes	Majority of respondents in both Dawson and McCone counties conditionally favored development. Community leaders in McCone County were less supportive than other groups.	Not Applicable	Not Applicable	Dawson - Good McCone - Good	
Quality of Life	Small town friendly atmosphere cited as most desireable quality of life.	Deterioration in small town atmosphere is expected.	Significant in Circle (McCone County). Much less so in Dawson County.	Dawson - Good McCone - Good	

CIRCLE WEST II TRACT
UNSUITABILITY CRITERIA RESULTS

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
1. Federal land systems	Applied	N/A	N/A	No federal land systems found within the tract.
2. Rights-of-way and easements	Applied	None	None	Applied to Federal surface and/or private surface over federal coal.
3. Buffer Zones	Pending	N/A	Yes	Requiresagreements w/local governments and private owners of dwellings.
4. Wilderness study areas	Applied	N/A	N/A	No wilderness study areas found within tract.
5. Scenic areas	Applied	N/A	N/A	No scenic areas found within tract.
6. Land used for scientific studies	Applied	N/A	N/A	No lands used for scientific study were found within the tract.
7. Cultural and Historical Sites	Pending further study	N/A	Yes	Applied upon completion of inventories (Dec., '81)
8. Natural areas	Applied	None	None	No designated natural areas within the tract.
9. Federally listed endangered species	Pending further study	N/A	Yes	To be applied in Dec. '81.
10. State listed endangered species	Pending further study	N/A	Yes	To be applied in Dec. '81.
11. Eagle nests	Pending further study	N/A	Yes	To be applied in Dec. '81.
12. Eagle roosts and concentration areas	Pending further study	N/A	Yes	To be applied in Dec. '81
13. Falcon cliff-nesting sites	Pending further study	N/A	Yes	To be applied in Dec. '81
14. Migratory birds	Pending further study	N/A	Yes	To be applied in Dec. '81

Criterion	Applicable to Tract	Exception Used (if applicable)	Additional Data Needed	Comments
15. State resident fish and wildlife	Pending further study	N/A	Yes	To be applied in Dec. '81
16. Flood plains	Applied	None	None	No significant flood plains were found within the tract.
17. Municipal watersheds	Applied	None	None	No municipal watersheds were found within the tract.
18. National resource waters	Applied	None	None	No national resource waters were found within the tract.
19. Alluvial valley floors	Applied	N/A	None	No drainages within the tract qualify as AUFs.
20. State proposed criteria	Applied	None	None	No State criteria

PRELIMINARY FACILITY EVALUATION REPORT

PRELIMINARY

FACILITY

EVALUATION

REPORT

PRELIMINARY FACILITY EVALUATION REPORT

GOALS AND OBJECTIVES

The Fort Union Regional Coal Team, in its consideration of leasing federal coal, will address the likely coal end-uses and their implications. The purpose of evaluating how the coal will be used is to present the most probable major impacts of development.

The end-use facility evaluations are at a reconnaissance level and the reports are presented only as general approximations of facility characteristics and impacts.

The uncertainty of actual end-use facilities and the inherent problems in defining a "typical facility" limit end-use analysis to broad generalizations. The evaluations are not meant in any way to substitute for detailed site specific evaluations, EISs, or analyses which come later when mining and facility projects are actually proposed. The end-use facility evaluations will not preclude any federal, state, local, or private decisions concerning actual end uses, facility siting, or end-use restrictions. The end-use reports are meant only to provide additional information to be used in decisions concerning the leasing of federal coal in the Fort Union Region and should not prejudice any later decisions.

End-use evaluations, referred to as preliminary facility evaluation reports, have been prepared for those tracts for which a new coal-use facility is expected to be built. One of the three proposed end-use facilities has been assigned to those tracts based on expressions of interest, tract size, or existing facilities. The typical facilities to be considered are: a 250 million standard cubic feet per day gasification plant; a 1,000 megawatt electric power generation plant; and an 85,000 barrel per day indirect coal liquefaction plant.

Part I of the report summarizes what the assigned typical end-use facility might be like. The description of the facility gives plant size, process technology, plant requirements (fuel, land, water, power), emissions, and other characteristics of facilities likely to be proposed in the Fort Union Region. The description includes ancillary facilities and a discussion of construction and operational aspects of the facility that are relevant to determining impacts that could occur in the vicinity of the tract.

The facility description is based on existing analyses, studies, environmental impact statements, and consultation with State and industry representatives. Part II of the facility report is an analysis of the facility impacts on the tract area.

The preliminary facility evaluation reports will be used by the Regional Coal Team to rank federal coal tracts with a better understanding of likely future development impacts and implications.

PART I

Assumptions and Variables

The typical electric power facility characteristics are based on numerous assumptions and reasonable values for important variables. Some of the assumptions and variables are based on best estimates. Others are based on existing literature, facilities, and on input from industry sources.

Facility Location, Type, and Size

Because of the economics of lignite coal, it was assumed in the early stages of the Fort Union coal leasing process that the end-use facilities would be near the tracts to be leased. The energy value of lignite coal as well as the water content make the transporting of lignite for long distances uneconomical. For purposes of issue level impact analysis, the electric power facility assigned to the Circle West II tract is not specifically located but assumed to be near the tract. Such an assumption will eliminate the problems of arbitrarily siting facilities. Facilities were sited, however for the air quality modeling. Where specific site location information was available from potential project developers it was used in the facility analysis.

The proposed electric power facility will produce 1,000 megawatts (gross) of power. The coal-fired electric power plants being constructed or planned in the region generally have from one to three generation units, each producing from 400 to 500 megawatts of power. A facility consisting of two 500 MW units was chosen to be representative of a typical electric power facility.

Construction Period

The construction time span for an electric power facility can vary greatly. A company hiring four to five thousand construction workers could complete the proposed facility in as short a time span as three years. A company could choose to lengthen the construction period or build parts of the plant capacity in two or more construction phases. This would reduce the construction work force and spread construction over as many as ten years.

The assumption is that the facility will be constructed in phases. For the two unit electric power plant, the second unit would begin construction in the third year after the first unit is begun. The total construction period would cover approximately eight years.

Employment

The construction work force will be a function primarily of the construction schedule. Work force numbers were supplied by the Basin Electric Power Cooperative. The average yearly employment figures are based on the projected work force for the Antelope Valley Power Plant.

Water Requirements

Water demands for an electric power facility depend on production technology, plant load factor (percent of output capacity), operation time, and water quality. The values used for water requirements are based on estimates from Basin Electric. The value for gallons per minute is an estimate of average water use for the facility. The yearly requirements are an approximation based on an operation factor assumed for the facility. This operation factor indicates the time the facility will be in operation each year. The electric power facility will assume an average load factor since peak power will not be needed full time due to varying load demand.

For analysis purposes, water for the electric power facility is assumed to come from the Fort Peck Reservoir.

Emissions

The air emissions for the electric power plant will depend primarily on the facility's production process, the amount and quality of coal burned, the level of pollution control. The electric power facility would use approximately 10 percent of the gross wattage it produces.

An assumption affecting air emissions from a generic facility is the quality of the coal. The sulfur, ash, and water content of the lignite will not only influence emissions per ton of coal burned, but will also determine the amount of coal required for a given facility. The air emissions from any type of coal conversion facility will be a function of the conversion process characteristics and the emission control technology used at the facility and the level of control used.

The impacts resulting from air contaminants emitted by the coal end-use facility are deduced by using established air quality standards above which deleterious effects of the contaminants are implied to occur. A facility's ability to meet air quality standards assumes there would be no significant deleterious effects to human health, animals or vegetation. Such an assumption is the subject of continuing discussion and is disputed by certain research studies. A more detailed discussion of this issue can be found on pages 37-94 in the Final West-Central North Dakota Regional Environmental Impact Study on Energy Development (October 1978). The facilities could also emit certain pollutants for which there are no standards. The anticipated levels of air quality concentrations of contaminants are obtained by measuring existing levels of air quality and adding computer simulation of the atmosphere loading resulting from the end use facility.

The air quality impacts are considered in terms of ambient air standards and prevention of significant deterioration standards. Under authority of the Clean Air Act of 1970, the State of Montana has promulgated its own ambient air quality standards. The purpose of the Montana Ambient Air Quality Standards is to control the quality of the air over Montana such that a) the health of sensitive and susceptible segments of the population will not be adversely affected; b) concentration of pollutants will not cause public nuisance or annoyances; c) significant damage to animals, ornamental plants, forest and agricultural crops will not occur; d) visibility will not be significantly reduced; e) metals or other materials will not be significantly corroded or damaged; f) fabrics will not be soiled, deteriorated, or have their colors affected; and g) natural scenery will not be obscured. Montana's ambient air standards are generally more stringent than the federal EPA standards, and they include a number of criteria for which there are no EPA standards, such as visibility (Class I areas only), hydrogen sulfide, and fluoride.

Under authority of the Clean Air Act Amendments of 1977, Prevention of Significant Deterioration (PSD) standards apply to all areas that are in compliance with federal standards for particulate matter and sulfur dioxide. PSD establishes three air quality classes. Class I areas allow only a small incremental increase in pollution beyond existing conditions in the area at the time of designation. The bulk of the United States was designated Class II, which allows for well-planned growth and some additional pollution, although within limits that are well below the standards. Class III applies to areas of industrial growth and permits incremental increases in pollution up to, but not exceeding, the standards. Since 1974, Congress, the states and Indian tribes have been eligible to petition EPA to classify areas Class I and Class III, providing that various specified procedures are followed. Wilderness and certain other specially managed areas in existence before August 1977 received automatic Class I designations, and the Northern Cheyenne Tribe requested and received Class I status for its reservation in mid-1977.

The federal Clean Air Act states that pollutants originating in Canada are to be included in calculating the existing air quality of neighboring regions of the United States for purposes of enforcing the PSD standards, unless the governor of a state takes action to exclude such pollutants.

After March 1979, the states were to be responsible for administering the PSD regulations and for processing redesignation petitions. However, due to changes in the federal rules, PSD delegation for Montana has not yet been approved. The Air Quality Bureau is presently

evaluating procedural alternatives for PSD administration.

An in-depth analysis of air quality impacts resulting from facilities associated with certain coal lease tracts was impossible. Discussion of site specific impacts without addressing the interactive and cumulative impacts would have little decision value. For the purpose of this analysis, the end-use facility which has been assigned to the coal lease tract will be discussed. This discussion will contain general statements regarding facility impacts on the air quality. The impact analysis is based on standard dispersion computer modeling using the worse case situation. The anlysis is in terms of compliance or noncompliance with ambient air quality standards or PSD standards. A limited analysis of this type cannot be substituted for a detailed permit review. Care must be taken to use this information with the proper qualifiers and should not be taken out of context.

Solid Wastes

Estimates of solid wastes from the facility are based on figures from Basin Electric. Estimates for ash and sludge could vary considerably depending on the ash content of the coal and the pollution control technology used. Planned facilities are proposing to dispose of solid wastes in the nearby mines.

ELECTRIC POWER FACILITY

Introduction

A typical coal fired steam electric power generation plant will consist of two 500 megawatt (gross) units located near a lignite coal source. The facility with an average operation factor of .90 and a load factor of .85, will be capable of delivering a maximum of approximately 900 MW to the existing transmission system. The facilities for the electric power complex would consist of the following major areas: 1) coal preparation, 2) power generation, 3) pollution control and waste disposal, and 4) pipeline and transmission facilities. See Figure 1.

The total land area dedicated to the electric power generation facility would be approximately 600 acres. The main building at the facility site will house the boiler and turbine units. Other structures at the site will include facilities for coal handling, cooling water, air pollution control, and administration.

Employment

The construction of two electric power generation units is expected to last approximately eight years. The average annual number of workers required for plant construction will peak in the third year of construction when substantial work on both units would be underway. The peak construction work force is expected to be approximately 1,900 workers in the second quarter of the third year. Once in operation, the facility will permanently employ about 200 people.

TABLE 1
AVERAGE YEARLY EMPLOYMENT

Year	1	2	3	4
Construction	309	1138	1248	798
Permanent				36
5	**6**	**7**	**8**	
666	580	682	168	
102	108	108	200	etc.

Source: Basin Electric Power Cooperative for Antelope Valley Station.

Coal Preparation, Storage, and Handling

Lignite coal would be transported from a nearby mine to a three day live storage pile or a sixty day dead storage pile. From the live storage pile, the coal would be sent by conveyor to be crushed before being transferred to the plant silos for intermediate storage. Finally, coal would be conditioned before being introduced into the furnace for ignition. A typical plant would burn an average of approximately 800 tons of coal per hour or about 5.5 million tons per year. See Figure 2.

Power Generation

In a coal fired electric power plant, the crushed coal is combined with air supplied by forced-draft fans and then ignited and burned in the boiler furnaces. The combustion in the boiler furnace produces heat which creates steam from feed water entering the boiler heat exchange system. After releasing energy through expansion in the high pressure section of the turbine, steam is returned to the boiler for reheating. After being reheated, steam is returned to the intermediate section and subsequently to the low pressure section of the turbine. Spent steam passes through the condenser where waste heat is removed, and the condensed liquid is returned to the boiler feed water system. Combustion gases from the furnace are exhausted to the atmosphere through the pollution control devices. Steam energy is converted to mechanical energy by the turbine and subsequently transformed into electrical energy by the generator. Generated power is routed through the main transformer for voltage step-up and then to a switchyard and transmission line system for distribution.

Water System

The water for the power plant systems would come from a nearby river or impounded water source. Raw

Figure 1

TYPICAL ELECTRIC POWER FACILITY

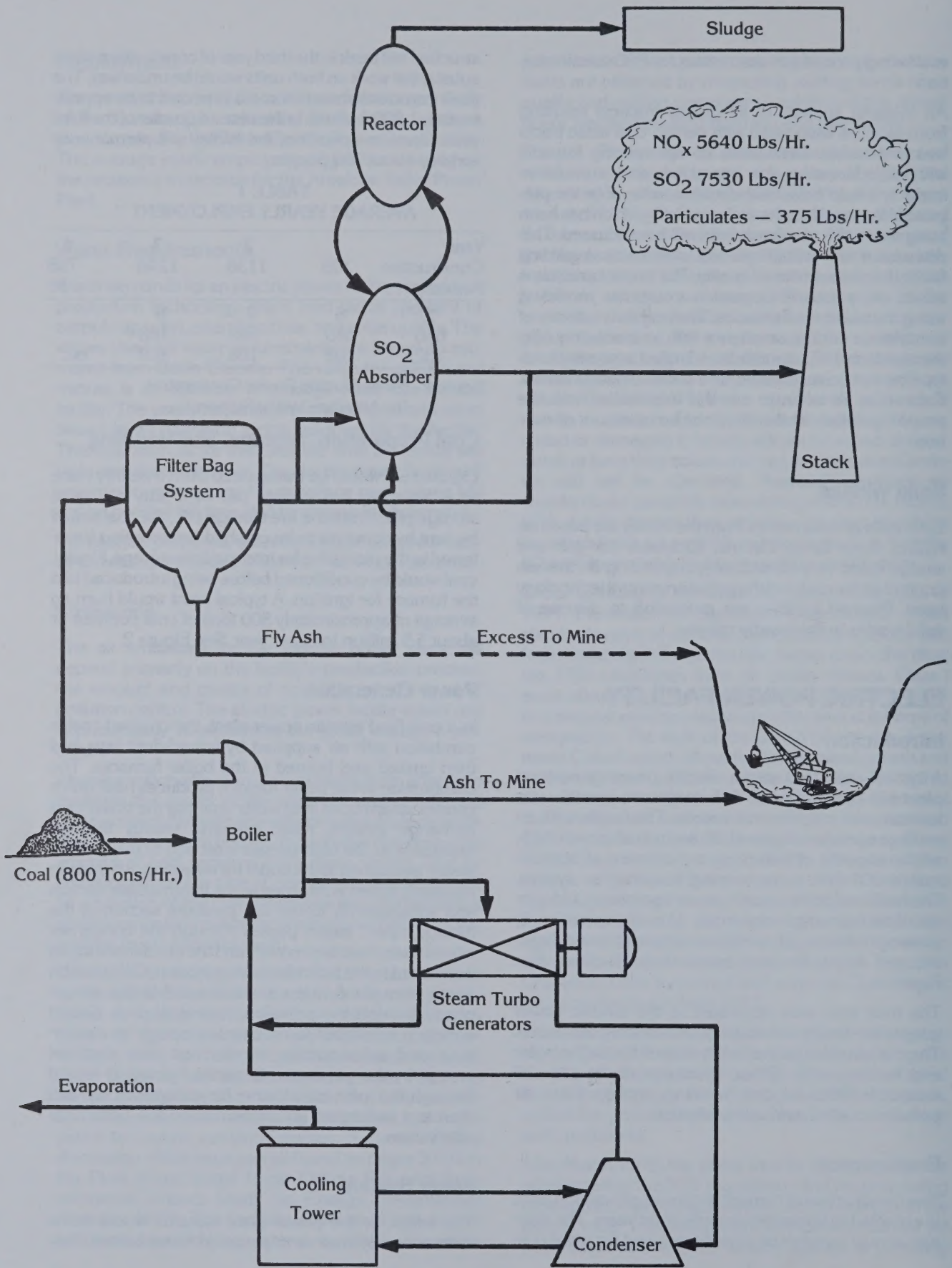
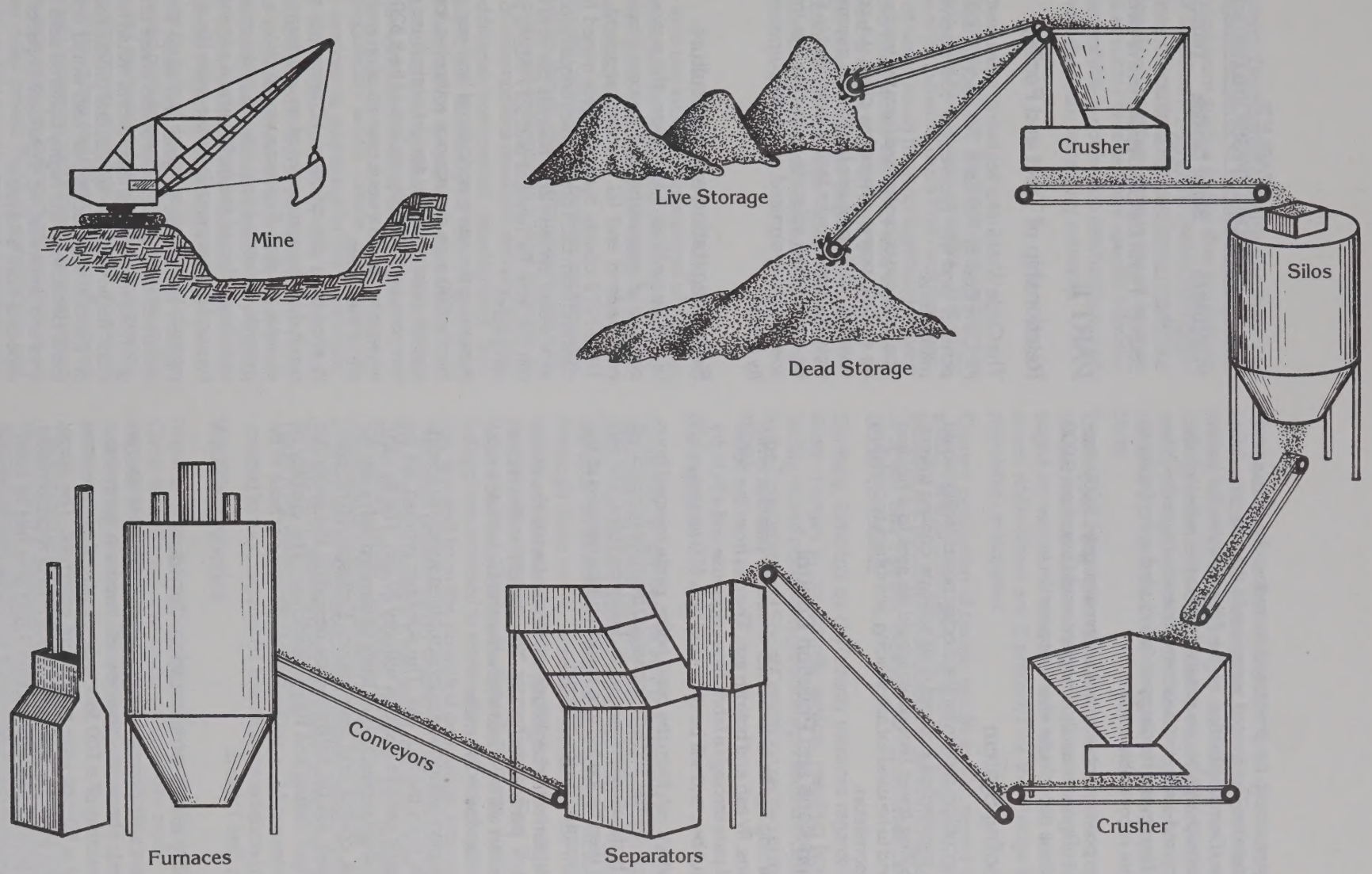


Figure 2

COAL HANDLING SYSTEM



water would be processed to reduce hardness and alkalinity. The treated water would then be stored for use. Demineralization of the filtered water for boiler makeup will be necessary to provide water of the required quality for the steam generation system. There will be several holding ponds included at the facility to store recoverable water.

The power plant will require approximately 13,000 acre-feet of water annually. The plant would use about 9,000 gallons per minute when in operation.

Cooling System

The cooling system for the electric power facility would be mechanical induced draft wet-type cooling towers. Cooling tower blowdown would be sent to a holding pond to be used for ash sluicing, scrubbers or coal dust suppression.

Emissions and Pollution Control

Burning lignite in the boiler produces gaseous emissions, fly ash and bottom ash. The gas from the boiler will pass through a fabric filter baghouse and a SO_2 dry scrubber, and will be dispersed by a 600-foot stack.

Bottom ash from the main boiler, pyrite rejected from the pulverizer and ash discharged from the hoppers will be hydraulically conveyed to dewatering bins. The ash will then be loaded into trucks and transported to the adjacent mine for disposal.

The fabric filter baghouse will be installed for the removal of particulate fly ash. The fly ash and scrubber product will be mixed with water and loaded into trucks for disposal in the mine.

The plant will include a dry scrubbing system to absorb SO_2 from the flue gas. The scrubber product will be treated prior to disposal with dry fly ash. The fly ash/scrubber product would likely be blended with water for dust control and stabilization. Emission of nitrogen oxides will be controlled by designing the boiler for proper mixing and flame quenching. The quantity of wastes would be approximately 80 tons per hour of fly ash/scrubber product and 10 tons per hour of bottom ash. See Table 2.

Utility and Transportation Corridors

Water will be pumped from the water source to a surge pond. The water pipelines will require a right-of-way consisting of a 100 foot wide construction easement and a 50-foot wide permanent easement. The surge pond would have a water surface area of approximately 42 acres and would contain 1,050 acre feet of water. Transportation corridors will be required for roads and a railspur. The transmission line leaving an electric power facility would be a 500 KV line with a right-of-way 150 feet wide connecting with an existing system.

TABLE 2
GASEOUS EMISSIONS (lbs/hr)

Particulates	Sulfur Dioxide	Nitrogen Oxides
375	7530	5640

Source: North Dakota Department of Health.

PART II

Relationship of Tract and Facility

The Circle West II tract lies twenty miles west of Circle in McCone County, Montana. The tract consists of 11,024 acres of land with recoverable coal reserves of 245.7 million tons.

The likely use of coal mined from the tract would be for an electric power generating plant. To consider the impacts of this coal use facility, it is assumed that the typical electric power facility described in Part I would be constructed adjacent to or near the tract with no specific site designated, except for purposes of air quality analysis.

Soils, Vegetation and Agriculture

In the Circle West II tract area, the agricultural land consists of approximately 6 percent cropland, 2 percent hayland and 92 percent rangeland. Based on 1978-1979 county averages determined from ASCS data and from BLM grazing files annual production per acre would average 28.4 bushels per acre of wheat, 1 ton per acre for hayland and .277 AUMs per acre for rangeland.

Assuming the same agricultural land use distribution for the 600 acre disturbance estimated for a generic electric power facility, annual agriculture production foregone on the facility site would be 8,520 bushels of wheat annually, in a worst case situation analysis, for the life of the facility.

A short-term disruption of 12 acres per mile would result during construction of an undetermined length of water pipeline. Roadways would disturb 14.5 acres per mile. A railroad spur, also of undetermined length until final siting of the facility would eliminate agriculture on 18 acres per mile for the entire life of the facility.

Erosion losses due to wind and water from ground disturbed during the construction phase of the facility, given State permitting stipulations, would not be significant. Regionally, the agricultural production foregone on the 600 acre facility site also would not be significant. Because of the highly-buffered soils in the tract area and downwind, no significant impacts to soils are expected from acid rains.

There is evidence documented in the literature (West-Central North Dakota Regional Environmental Impact

Study on Energy Development, 1978) that there are potential negative impacts to vegetation and to livestock downwind from such a facility due to nitrogen oxides, sulfur dioxide and particulate matter, no models for ground level concentrations have been created for this evaluation. Such negative impacts would be analyzed in detail at such a time as more specific information becomes available in conjuction with facility permit application with the State permitting authority.

Water

Water requirements for an electric power facility are approximately 13,000 acre feet per year. The likely source of water for industrial use is Fort Peck Reservoir. Withdrawal of water would have no significant impact upon the reservoir. Facility wastes of ash, sludge and water disposed of in the mine do have the potential to degrade water quality if they are disposed of within the saturated zone which develops upon reclamation. Present regulations require state approval of disposal sites.

Land Use

Changes in land use include displacement of existing use, increased intensity of existing uses and the introduction of new uses. The site of the facility is likely to displace agricultural use.

The optimum site conditions for facilities are the same as for agriculture, that is: gentle topography and soils with good drainage characteristics. The increase in population of communities results in demand for new housing, additional commercial development and expanded public use facilities. The area of this development will likely be on off-site agricultural land. The on-site displacement of agricultural land use is discussed in the Agriculture section of this report.

Increased population would create a demand for community services as addressed in the Economics and Social Conditions section of this report. This demand implies a need to expand existing facilities and commercial establishments or to create new ones. Existing commercial establishments may suffer through the construction of new facilities outside the downtown areas. Public services would be stretched in the short-term by lack of capital to implement change due to increased population. Parking shortages, traffic congestion and excessive wear and tear on roadways would make downtown areas less habitable. Municipal organizational structures and physical space may prove inadequate with increased population. For example: a part time mayor may be overworked, processing of permits may delay private building construction and filing space for public records may prove inadequate.

With the influx of workers and their families, a change in the composition of the community is inevitable and demands for new forms of public and commercial facilities for shopping, recreation, entertainment would ensue. These types of changes are likely to result in dissatisfaction by both the existing resident population and by the newcomers. Conflicts are likely to occur as a result of the contrast in the lifestyles of these populations.

Existing planning varies considerably from community to community. Some are prepared for change presaged by recent oil and gas development in some areas, while others are ill prepared for the change in population anticipated.

Current perception of county residents with regard to roads, retail opportunities, recreational/entertainment facilities and housing are discussed in detail in Chapter 2 of the Site Specific Analysis for Economics and Social Conditions.

Similarly, forecasts by city/county planners regarding likely changes in community services resulting from facility related population growth are presented in detail in the Economics and Social Conditions section of this report.

Recreation

Recreation in the tract vicinity is limited to dispersed seasonal big game hunting with pronghorn antelope being the predominant species harvested. Access depends on landowner consent and climatic factors. Although there are no recreation facilities in the tract vicinity, existing recreation facilities in the region (community camping and picnic areas, Fort Peck Reservoir, and Charles M. Russell National Wildlife Refuge) are expected to receive the majority of recreation demand from the projected population increase. The social attitude survey revealed a concern for existing recreation facilities. It was stated that an increase in population would hopefully result in the possible upgrading of already marginal recreation facilities. This concern will be addressed with the expected recreation demand from increased population in the regional EIS. There is no wilderness in the area.

Wildlife/Fisheries

Impacts of an electric power facility on wildlife in the Circle West II tract area could occur in two areas: 1) impacts from destruction of habitat and 2) direct and indirect impacts from the increase in human population.

The removal of vegetation for a 600 acre electric power facility and the expansion of urban areas, highways, and railroads would prevent or reduce the use of an area by wildlife regardless of the type of vegetation removed. A large area south of the tract is essential antelope habitat. Golden eagle and prairie falcon nests are situated

on the west and essential deer winter range occurs to the east.

If powerlines, pipelines, access and haul roads are constructed in key wildlife areas, partial or total destruction of habitat would occur depending on the magnitude of development. The worst case would destroy present wildlife populations in the area. Wildlife oriented recreation such as hunting and wildlife observation would have to be sought elsewhere. Wildlife would be impacted by eagle electrocutions on powerlines, migratory bird mortality from striking powerlines close to wetlands, road kills along transportation routes through important wildlife areas, harassment of wildlife by off-road vehicle use, increased poaching, as well as habitat destruction.

Poaching and road kills have increased dramatically in areas of North Dakota, Montana, Wyoming and Colorado where energy development has occurred. The problem is compounded in areas where transportation corridors are located in important wildlife areas and shift changes coincide with wildlife feeding periods. This situation could occur in the Circle West II tract area.

The impact to wildlife could be mitigated by: 1) siting the electric power plant and associated facilities with regard for critical wildlife areas, 2) adjusting work shifts to avoid feeding times of highly visible wildlife, 3) mass transportation of employees, 4) providing funds to State fish and game agencies to better control illegal shooting of wildlife, and 5) adopting a poaching clause in union contracts.

Taking water from shallow bays in Fort Peck Reservoir could have significant adverse impacts. These areas are prime nursery and spawning areas for sport, commercial and forage fish. Taking wtaer from deeper non-critical areas of the reservoir could reduce or eliminate the significant impacts to fisheries.

The cumulative increases in industrial, urban and other water uses will dictate the severity of the impacts on fisheries. The cumulative impact will be addressed in the regional EIS to be prepared.

Cultural Resources

The Circle West II tract area has not been inventoried to date. Information from existing inventories (BLM unpublished data, Davis 1976; Greiser 1980) outside the Fort Union coal region suggests that the predominant prehistoric sites should be lithic scatters of varying size, density and function (ca. 70-80%). Other expected prehistoric resources include stone circles (ca. 10%-20%), ceramic bearing sites, rockshelters and kill sites (ca. 10% combined). Expected historic resources include homestead and ranching remains (ca. 50%), historic grafitti and rock art (ca. 20%), freight roads, dugouts, cairns, trading pots, burials and battle sites (ca. 30% combined). Further information on cultural resource occurrence, distribution and significance cannot be quantified prior to inventory.

Visual Impacts

Eastern Montana has very high but common visual quality. In the absence of other types of visual experiences, the landscape is not highly valued as scenery because of the vast distances involved in crossing this relatively uniform area. Most highways roll with the landform so views alternate between nearby features at low points and panoramas of up to thirty miles at high points in the roadway profile. The landscape is seen in terms of these short vistas of landscape elements that will not be seen again, and short duration views of distant landscapes in which any vertical object or landscape feature serves as a focal point.

Large structural features in the Eastern Montana landscape contrast with the landscape both in terms of the visual surface (the character of what is seen) and in terms of function. Vertical and linear components of a facility, because of hard architectural edges of the structures, and the transitory nature of panoramic views imply a visual importance of these large objects for orientation. The aesthetic response is secondary to this visual function.

Neglecting cultural bias, the aesthetic response to stark architectural lines and pure planes of color contrasting with the simple curvilinear landforms of the countryside can be considered positive. This visual experience would be immediately comprehensible and would provide relief from a relatively uniform countryside. Beyond this initial response, however, are responses with origins in cultural bias and the individuals' relationships to the land. The greatest effect would be upon local residents with memories of the existing landscape to use as a comparative basis of judgment. If no attachment to the existing landscape is present, the facility would be judged more on its quality than on cultural bias.

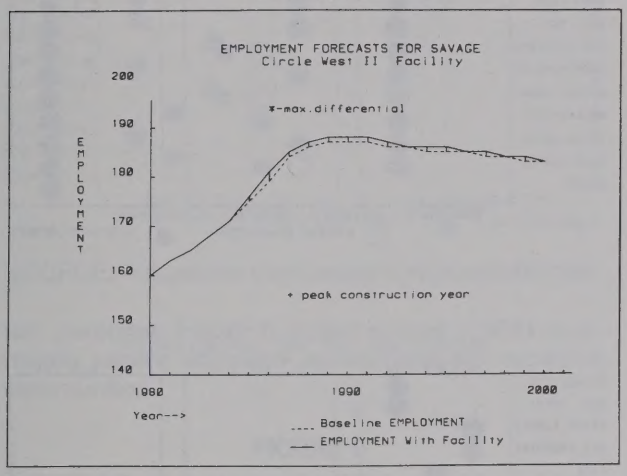
The visual impact would be the penetration of the skyline by the facility in views from communities and major transportation corridors. The 600-foot stack could potentially be seen thirty or more miles away. Powerline originating at the site would have more extensive consequences and consideration for corridor planning related to the placement of facilities is essential to maintain visual quality in the region. The facility would be highly visible and would demand a response either positive or negative. The dominance of the facility in the landscape could be perceived as a loss of amenity through impairment of the landscape as it now exists for the forty years of the facility's expected life.

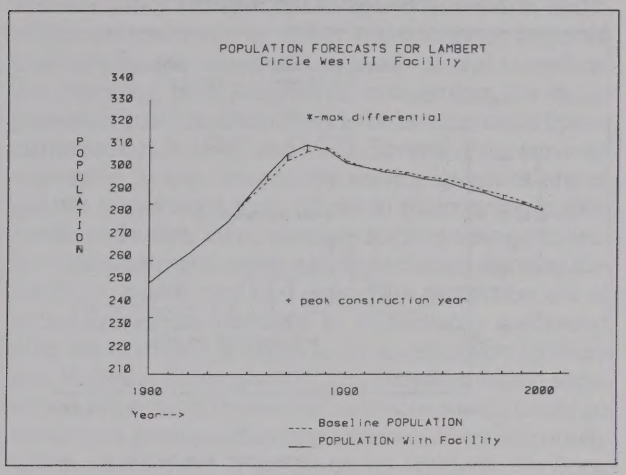
Economics and Social Conditions

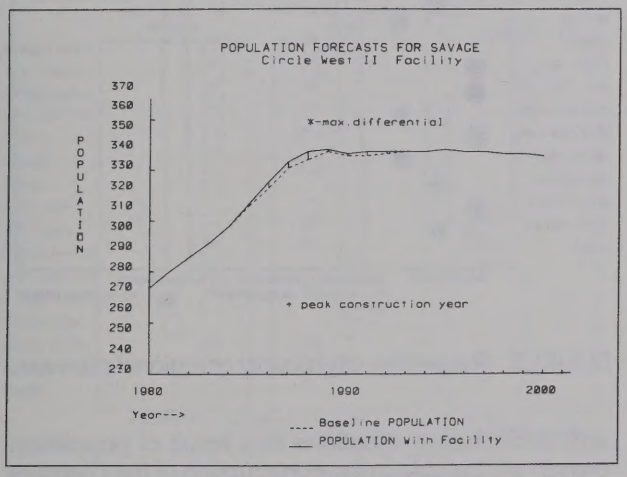
Construction and operation of the Circle II Facility would result in impacts upon services in some com-

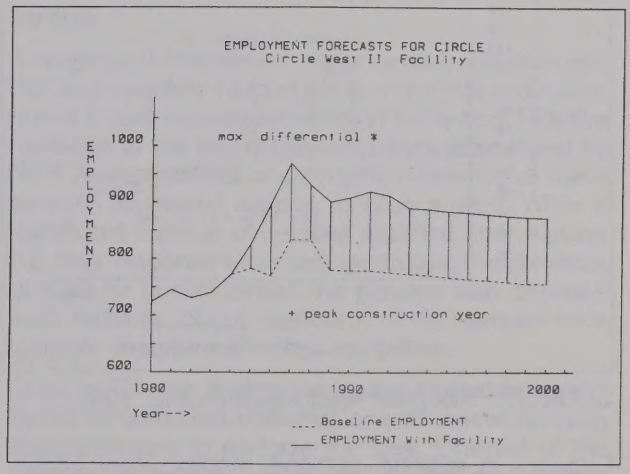
munities within the areas as a result of population growth associated with employment opportunities. Figure 3 shows forecasted community employment and population levels through the year 2000 both with and without development of the facility. As these figures show, Savage, Lambert, Circle, and Brockway experience increases in both population and employment as the result of development of the facility.

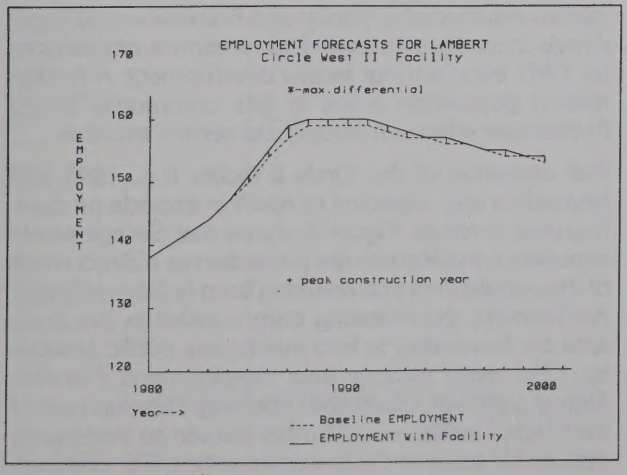
FIGURE 3

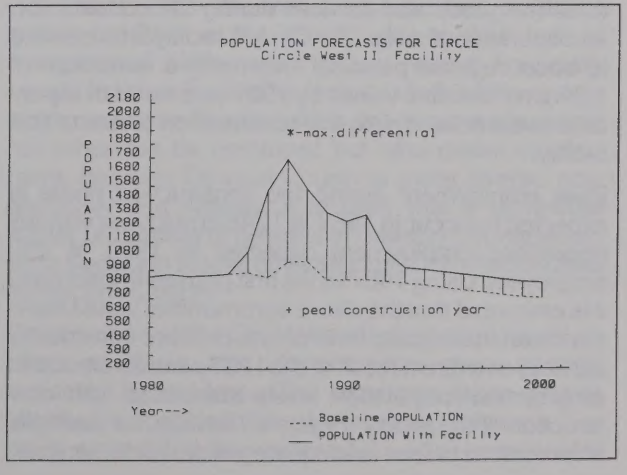












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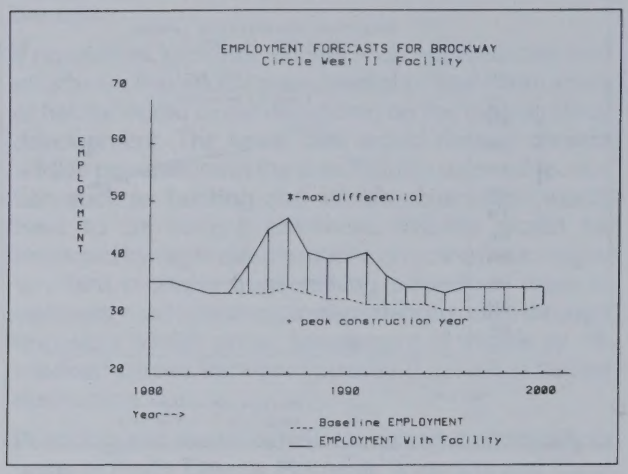
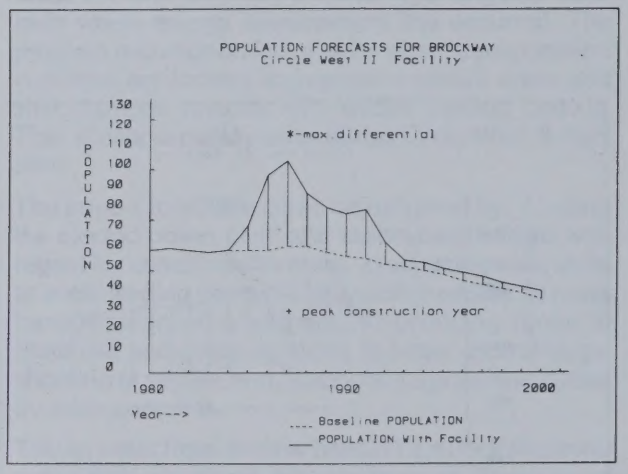
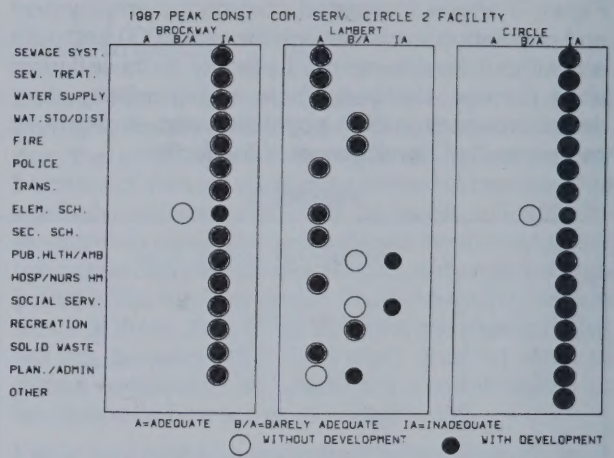
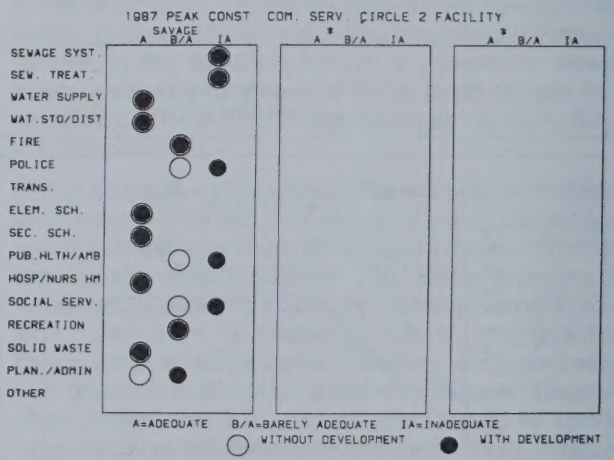




SOURCE: Mountain West Research, Inc., 1981.

FIGURE 4





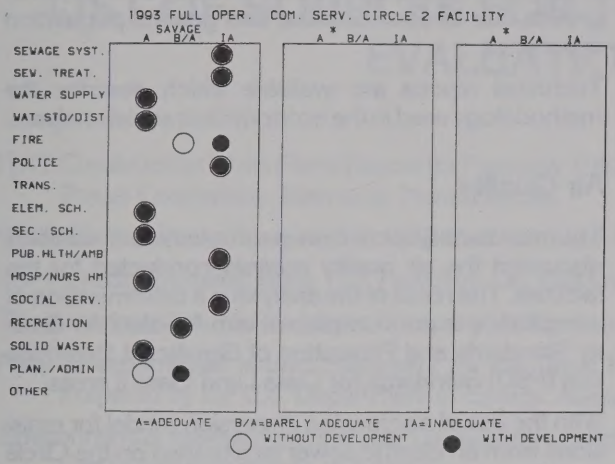
SOURCE: Respective city/county or regional planners.

Changes in regional personal income from facility development are expected to be insignificant through the year 2000. The communities in which the workers and their families reside would experience some increases in economic activity as a result of employee's payroll expenditure and through company expenditures for goods and services during the construction and operation phases. The Circle II facility is forecasted to boost regional personal income by a maximum of 1.3% over baseline values by 1987 as a result of expenditures associated with the construction phase of this facility.

Peak employment during the construction phase is expected to occur in 1987 at 1248 employees with full operations employment expected in 1993 at 200 employees. Using 1987 as the first primary impact date, it is estimated that the above communities would experience an inadequate level of one or more community services as a direct result of the 1987 peak construction employment/population levels associated with construction of the facility (Figure 4). Savage, for example, is forecasted to face inadequate police, social services, and public health situations as a result of population growth attributable to the construction of the Glendive facility. Additionally, Sidney and Fairview would experience an inadequate level of some community services by 1987 even without facility development. A facility-related population influx in this community would further exacerbate an inadequate service situation.

Full operation of the Circle II facility (i.e., 1993 and beyond) is also expected to result in impacts on communities services. Figure 5 shows that Savage would experience inadequate fire protection as a direct result of the population influx resulting from facility operation. Additionally, the following communities in the study area are forecasted to face inadequate public services by 1991 even without tract development: Fairview, Sidney, Lambert, Circle and Brockway. Development of the Circle II facility would further worsen an inadequate service situation in these communities. For compari-

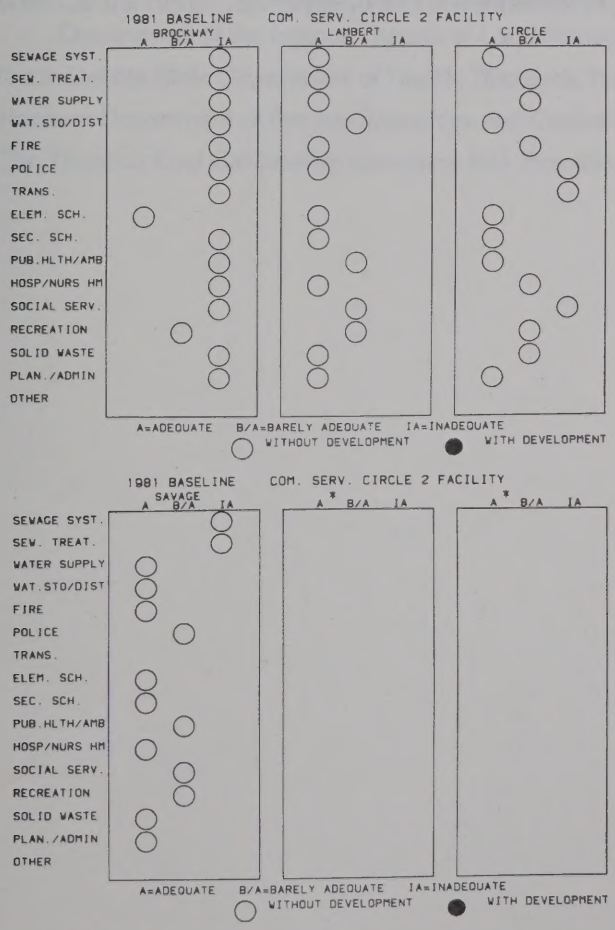
FIGURE 5



SOURCE: Respective city/county or regional planners.

son purposes, Figure 6 shows current (1981) community service adequacy assessments for impacted communities.

FIGURE 6



SOURCE: Respective city/county or regional planners.

The adequacy ratings appearing in Figures 4, 5, and 6 reflect assessments by either city-county or regional planners for the communities involved and constitute the planners best judgments concerning the fiscal (revenue/cost) situation likely to be encountered by the communities in 1987 and 1993. Several of the services appearing in the community service graphics are of greater importance than others in maintaining public health and safety. Basic services such as sewage collection and treatment, water supply and water storage/distribution, health care and police/fire protection are of more immediate concern to community well-being than are nonbasic services such as recreation facilities and libraries. Consequently, communities which experience impacts to these basic services would undergo somewhat greater difficulties than would a community which experiences impacts on its nonbasic services. Additionally, inadequacy of basic services (water and sewage systems especially) can be difficult for a community to deal with because of the relatively large capital expenditures required for upgrading these types of services.

A majority of interviewed respondents in Dawson and McCone counties support the construction and operation of a coal conversion facility(s) in the area. Fifty-five residents in the two county area were interviewed by BLM representatives and roughly two-thirds of these persons expressed support to such a plant. While a significant number of persons qualified their support (i.e. their response was contingent upon maintenance of high air quality levels), the persons who opposed such facilities (about one-fourth of the sample) were typically unequivocal in their opposition.

Dawson County leaders were very favorable toward facility construction, while McCone officials were much more reluctant to endorse the idea. One-half of the community leaders interviewed in McCone County were either neutral or uncertain toward the local benefits and costs of such an operation.

If such a facility were placed in or near the Circle West II tract, there would be a variable distribution of benefits and losses within the area. Some persons would be unable to share in the benefits due to their lack of occupational skills, while others would financially benefit from such a facility. Included in this latter group are persons who have the skills, and persons who might not otherwise be employed but who desire employment. Because Dawson County is more diverse, economically and socially, it is likely that a somewhat higher proportion of persons in Dawson County would be in a position to take advantage of such a facility than in McCone County.

Construction of the Circle West II plant would have an effect on those area characteristics most strongly endorsed by residents. The rapid population growth attached to construction of a plant would result in a more segmented, more stressful, social environment

than presently exists or would exist without the facility. The existing level of social homogenity would be reduced. Therefore, persons who appreciate the relatively slow paced, informal, and personable social environment would have their perceived quality of life somewhat reduced. This would be particularly noticeable during the construction phase of the project. Beyond that time, it is likely that routine social relations would be reestablished and the stressful social environment of the construction phase would be reduced, if not eliminated.

Dawson County and the cities of Glendive-West Glendive appear to be in a much more favorable position to deal with rapid population growth than McCone County and the communities of Circle and Brockway. Dawson County is more economically and socially diverse, has a larger population base, has not experienced the population losses of McCone County during the last several decades, and to some extent, has had experience with industrialization. For these reasons, the capacity of the communities in Dawson County and the county itself to absorb rapid growth and change is much greater than in McCone County.

The impact of rapid population growth in McCone County, would likely be very significant if the Circle West II plant were to be built, at least during the construction phase of the project. Dawson County communities would likely be able to more successfully deal with such growth due to administrative and general population experience.

Technical reports are available which describe the methodology used in the economics or social analyses.

Air Quality

The introductory section on assumptions and variables discussed the air quality analysis conducted for the facilities. The result of the analysis is a determination of compliance or noncompliance with Ambient Air Quality Standards and Prevention of Significant Deterioration (PSD) Standards for Class I and Class II areas.

With the use of a screening dispersion model for emissions from an electric power facility sited on the Circle West II tract, it has been forecast that the facility would not violate Montana or North Dakota Ambient Air Quality Standards and would not violate PSD Standards for Class I and Class II areas. The increased concentration levels for TSP, NOx, and SO_2 resulting from the facility were forecast to be below the detectable level at the border of the Class I area of the Theodore Roosevelt National Park in North Dakota.

LIST OF SOURCES FOR THE PRELIMINARY FACILITY EVALUATION REPORTS

ITAT Construction Work Force Report for February 1981; Inter-Industry Technical Assistance Team, Basin Electric Power Cooperative, Bismarck, North Dakota.

Basin Electric Power Cooperative; 1717 East Interstate Avenue, Bismarck, North Dakota 59501.

The Nokota Company; Suite 112, Provident Life Building, Bismarck, North Dakota 58501.

The American Natural Resources Company, 1 Woodward Avenue, Detroit, Michigan 48226.

Final Environmental Impact Statement for the Great Plains Gasification Project, Mercer County, North Dakota. Prepared by the U.S. Department of Energy. August 1980.

Environmental Assessment of a Coal Gasification Complex in Dunn County, North Dakota. Prepared by the Natural Gas Pipeline Company of America.

Identification of Synthetic Fuel Impacts: A Preliminary Assessment. Prepared for the Montana Department of Natural Resources and Conservation by teams at the University of Montana and Montana State University. August 1980.

Montana Energy Almanac. Prepared by the Montana Department of Natural Resources and Conservation. October 1980.

West-Central North Dakota Regional Environmental Impact Study on Energy Development. Prepared by the U.S. Department of the Interior, Bureau of Land Management and the State of North Dakota. October 1978.

North Dakota State Department of Health; Bismarck, North Dakota.

Montana Department of Natural Resources and Conservation; Helena, Montana.

The Tenneco Coal Gasification Company; P.O. Box 491, Glendive, Montana 59330.

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